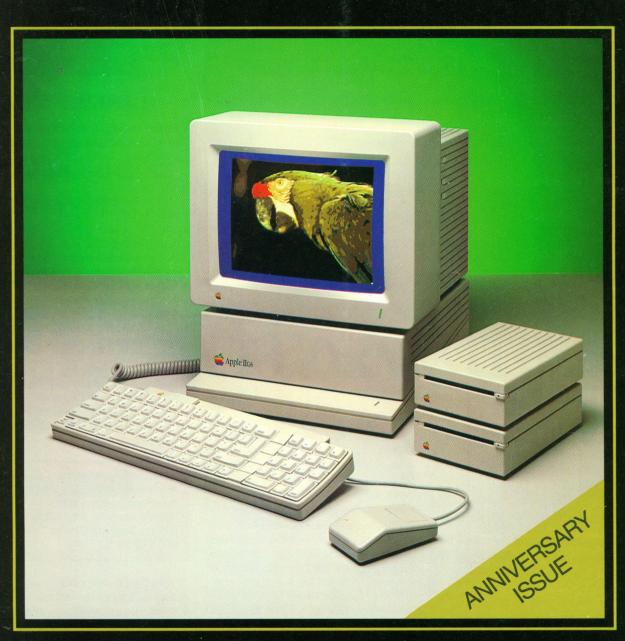
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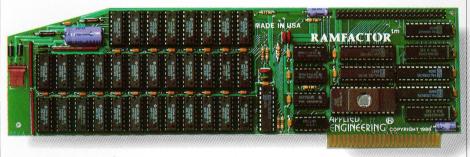


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All the leading software is already compatible with RamFactor. Programs like Apple-Works, Pinpoint, BPI, Managing Your Money, Dollars and Sense, SuperCalc 3A, PFS, Mouse-Write, MouseDesk, MouseCalc, Sensible Speller, Applewriter IIe, Business Works, ReportWorks, Catalyst 3.0 and more. And RamFactor is fully ProDos, DOS 3.3, Pascal 1.3 and CP/M compatible. In fact, no other memory card (RamWorks excepted) is more compatible with commercial software.

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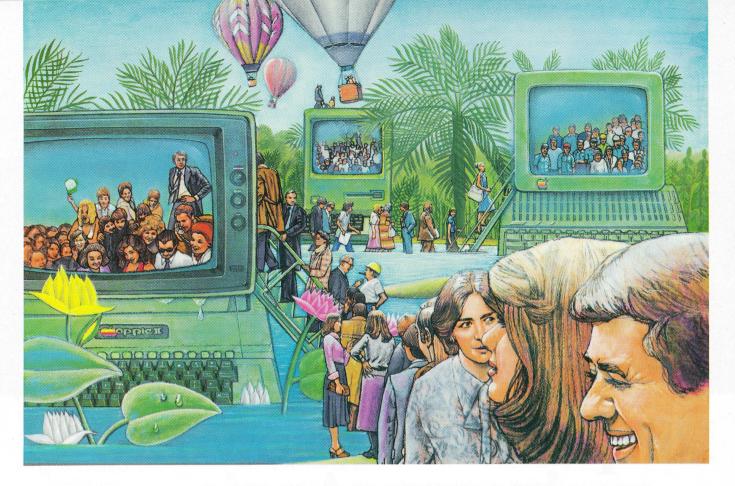
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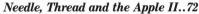
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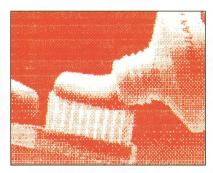
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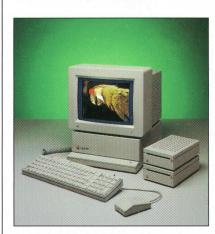
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#### Into the Future

Apple II Forever, the phrase that Apple coined in April 1984 at the birth of the IIc, is still current in a big way—a very big way.

The IIGS ("Graphics/Sound") that you see on our cover gives the solid base of Apple II software a renewed life cycle, and introduces some utterly fantastic new software. This new machine can proudly stand alongside the new generation of computers—Amiga, Atari ST—and run your oldest and most favorite software. No one's being left in the dust; rather, we're being rocketed into the future.

That future is filled with great sound (the IIGS has an Ensoniq sound chip), wonderful color (a palette of over 4,000 colors to choose from), more RAM (256K and expandable), and more speed.

You'll be able to upgrade your IIe by swapping motherboards. We expect that swap to cost you around \$600. (At the time of this writing, Apple hadn't made prices available.)

Should you make the swap—and what will it do for you? These are questions we begin to address today in *II Computing* and will continue addressing. In this issue, veteran Apple II writer Charles Rubin offers an overview of the IIGS and its position vis-a-vis other computers, including Apple's own Macintosh. Our technical staff takes a detailed look at the IIGS from the inside out and we also give you previews of some of the remarkable software that is being developed at a furious pace.

This "IIGS" issue has extra importance for us at *II Computing*: it's the issue that marks our one-year anniversary. From the start, we've committed ourselves to bringing you creative ways to enhance your computer use, and what better time than now to reaffirm that promise? For those of you who do upgrade, we'll be there



with all the latest IIGS news. For those of you who choose not to upgrade now, we'll continue with information on the rest of the II line, for without a doubt there will be plenty of development for the standard IIs. John Sculley, president of Apple Computer, stated in an early IIGS meeting with the press that the IIGS may not immediately be for everyone. That's why they'll continue to support the existing II line and provide upgrades.

Something else is new in this issue: "Teacher/Parent Tips," four pull-out lesson plans located in the center of the magazine. Through talking with parents and especially teachers, we realized that extra ideas and tips on how to use *II Computing* programs and other software as well would benefit teacher, parent and student. Sara Armstrong, a Montessori teacher from Berkeley, California, has developed plans for "Flash Math," Type-Right" and "Calendar Maker," three II Computing type-in programs, and for "FactWorks," a neat product from ImagiMedia reviewed here. Let us know what you think.

And now I invite you to read all the news. Get set for the IIGS; it's really a winner.//

ANITA MALNIG, EDITOR

### New Apple software pages 94 and 95

#### **UPGRADE POLICY**

Products that are developed exclusively for The Catalog are backed by an excellent upgrade policy. Just send your current original program disk with proof of purchase and specify the revision you want. We will copy the new version directly onto the original disk. Please include \$7.00 for upgrade and handling fee. Send it to The Catalog Upgrades, 524 Second St., San Francisco, CA 94107.

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#### READER FORUM

#### MORE SOFTSTRIPS

Last week I purchased my first issue of *II Computing*, and I am both very impressed and delighted with your magazine. Please keep in mind those of us who look for interesting program listings in magazines.

Second, I accepted your invitation with regard to the Cauzin Softstrip Reader. I found a local software dealer who was kind enough to demonstrate the reader. It was impressive to watch Philip Chien's Shuttle Tracker read, loaded, and running in a matter of seconds. I bought one! Now, don't let me down, and continue to present Softstrips in your magazine.

Ted Garcia Corpus Christi, TX

#### NOT THE USUAL

I am not usually in the habit of writing praise about a magazine, but *II Computing* is not the usual magazine. Having been with you from the first issue and being a charter subscriber, I have been totally satisfied with the content of your offering. "Font Editor" and the hi-res "Typer" programs in the June/July issue were really interesting and exceptional.

Please continue these useful utilities, the great reviews, and all the excellent programs and articles that have been presented to date. I am supporting you and am looking forward to the time when *II Computing* will be a monthly magazine.

Louis Lencioni Cupertino, CA

#### TYPO II WINS

While checking through the computer magazines at a local bookstore I discovered *II Computing*.

The thing that decided me to subscribe was your program section, which included Typo II, a program that didn't cost anything except a little time. I was also impressed to see you use the Cauzin strip reader in one of your programs. I do not yet have one, but hope to in the near future, and I will only subscribe to or renew those magazines that use the Cauzin strip.

James A. DeWalt Louisville, OH

#### GOOD WORK

As a new owner of an Apple IIe I have enjoyed your magazine. It has given me the opportunity to learn some BASIC programming and explore some of the functions not mentioned in the owner's manual. Please keep up the good work in both type-in programs and interesting articles for the IIe.

Ronald N. Lott Washington Court House, OH

#### INSTANT CORRECTION

When we wrote Apple II Instant Pascal, our goal was to provide a comfortable environment for learning Pascal as an introduction to programming. We are glad that you think we succeeded. Thank you for the favorable review. (April/May 1986 issue).

However, we would like to point out that Instant Pascal was conceived and developed by THINK Technologies, Inc. and is licensed for distribution to Apple Computer, Inc. While Robert Moll and Rachael Folsom deserve much credit for their excellent textbook, the product belongs to THINK Technologies, Inc., exclusively.

Robert W. Herold Robert W. Swerdlow THINK Technologies, Inc.

continued on next page

#### Apple Programmers and Developers Association

If you're a programmer, there's something else that's new from Apple. It's called APDA: the Apple Programmers and Developers Association, a joint project of Apple Computer and the A.P.P.L.E. Co-op of Renton, Washington. According to Dick Hubert of the A.P.P.L.E. Co-op, APDA will provide timely, highly technical information for all new and existing Apple products—"It's a one-stop shopping center for beta release versions of Apple and third party technical publications."

APDA's not for beginners. For annual dues of \$20, each APDA member receives a quarterly newsletter listing products available. Those products include early versions of technical publications from Apple and other companies that create Apple-compatible products. For the first time, you don't have to be a Registered Apple Developer to get advance technical information on new Apple products.

If you join APDA before the end of 1986, you'll receive a free copy of either *Programming the 65816* by David Eyes and Ron Lichty or *68000 Macintosh Programming* by Scott Kanaster.

If you're interested in becoming a member of APDA, ask for an application from:

Apple Programmers and Developers Association A.P.P.L.E. Co-op 290 SW 43rd Street Renton, WA 98055 CIRCLE 253 ON READER SERVICE CARD

#### READER FORUM

#### WHAT IT TAKES

I must give my congratulations to you. At first I thought your magazine was just okay. I even thought you might not survive this far. But you've got me as an avid reader. You proved to me you have what it takes with your Graphics issue (Vol. 1, no. 5). Keep up the good work! Mike Javorka Bethlehem, PA

#### **Newton's Apple Freeware**

This month, there's something new for you on II Computing's Action Disk—courtesy of Newton's Apple.

Newton's Apple is the popular PBS science show hosted by Ira Flatow. Each week it explores topics like flight training, caves, blood pressure, baseball bats, archaeology, frozen foods, and what happens when you break a concrete block on the stomach of a man who's lying on a bed of nails.

"The premise of the show is to get people asking questions - all kinds of questions—and then try to find out

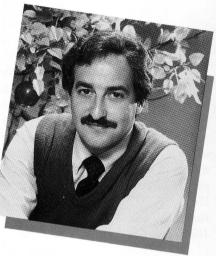
the answers," says James Steinbach, executive producer of the show. "The reason for the computer programs is that we want to use every way possible to get people asking questions. What better way than with computer programs?" Though Newton's Apple isn't named for Apple Computer, Apple has loaned the show five computers — they're used to keep track of questions from viewers, which come in by the thousands.

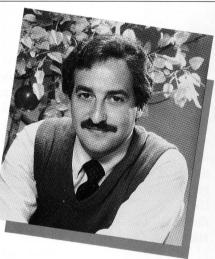
This season, for the first time, Newton's Apple is also creating free software for Apple II computers - and you can get it in *II Computing's* Action Disk edition! Each BASIC program is connected to a segment of the TV showfor example, the program on this month's Action Disk is about probability, one of the first topics covered on Newton's Apple this season.

If you don't have the Action Disk edition of II Computing but you have a modem, you can also get the Newton's Apple freeware from the Apple forums on CompuServe and the Source, as well as from many local computerized bulletin boards. Teachers in many areas can get copies through their local school boards.

Teachers can also get teacher's guides, posters and student handouts for use with the show by writing to TelEd, Inc., 7449 Melrose Ave., Los Angeles, CA 90046, or calling (213) 655-8970. The teaching materials, like the freeware, are funded by the Du Pont Company, which has been supporting Newton's Apple for the last three years.

We hope you'll enjoy the freeware on this month's Action Disk-as well as the new season of Newton's Apple. Check your local television listings to find out when the show is on in your area. And if something you see on Newton's Apple gives you an idea for an Apple II program, send it to us—we'd like to see it in II Computing!//





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"I recommend Applied Engineering products wholeheartedly."

> Steve Wozniak, the creator of Apple Computer

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Since TransWarp is completely transparent, you won't need preboot disks or special software. It's ready to go right out of the package!

#### **Speed** = **Productivity**

Imagine the productivity gains you'll achieve when your programs are running over three times faster. TransWarp is so powerful, your Apple will make IBM PCs™ and even ATs™ look like - whether you're planning taxes, plotting charts or playing games! Take a look at a few of the features that set TransWarp apart:

- 3.6 MHZ 65C02
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- Accelerates main and auxiliary
- · Low power consumption for cool operation
- Totally transparent operation with all software
- Plugs into any slot, including slot 3 on the Apple IIe
  Accelerated 16 bit option
- available

#### Satisfaction guaranteed!

Give your Apple the TransWarp advantage. With our risk-free 15day money back guarantee, you have nothing to lose but wasted time. Call today!

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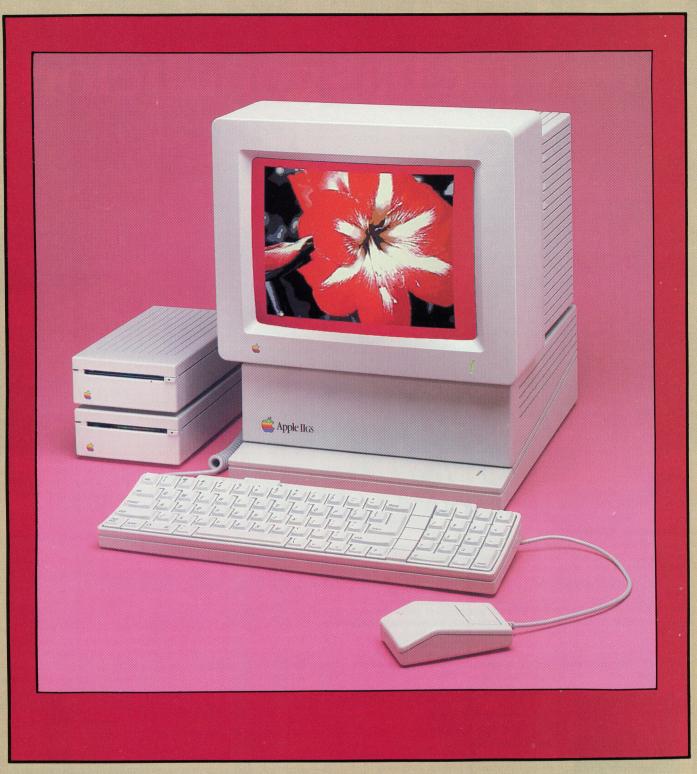
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SOFTWARE ON MONITOR IS PAINTWORKS PLUS

# THE IIGS

Apple's New "Super" II

by CHARLES RUBIN

PHOTOGRAPHY by MICHAEL JAY

And the sound—with 15 voices, digitally sampled and running independent of the CPU—is the best anywhere.

erided for years now as The Computer That Technology Forgot, the Apple II has been reborn as the IIGS - a sleek, fast, powerful and extremely likeable new machine that runs most existing Apple II software and provides an impressive upgrade path into today's and tomorrow's technologies. The IIGS combines the easy setup of the IIc, the expandability of the IIe, and the friendliness of the Mac on one hardware platform that offers a new level of Apple II performance. Apple II owners who have gritted their teeth as other computers have offered more power can once again hold their heads high.

The IIGS comes with 256K of RAM, 4,096 colors with up to 640-by-200 resolution, a 15-voice sound generator, a 16-bit processor, 128K of ROM that contains many of the Mac's graphic routines and helps produce a Mac-like interface, a state-of-the-art keyboard, and a family of sleek new peripherals that are designed to be interchangeable throughout the Apple product line. With the IIGS, Apple is meeting the challenges of Atari, Commodore, IBM and Tandy, and is

offering a persuasive reason for millions of loyal Apple II owners to stay with Big Red, rather than defecting to an enemy's camp.

#### UPWARD MOBILITY FOR THE APPLE II

The most important feature of the IIGS as far as the Apple II line goes is that it provides a gateway to a whole new level of performance. Apple IIe and IIc owners have been able to make small steps forward with add-in RAM, software patches, and other temporary expedients, but the IIGS represents a whole new class of power—a 16-bit CPU, better graphics, better sound, and better access to peripherals.

Apple had several goals in creating the IIGS, based on input from user groups, dealers, schools, and other customers, and it has addressed all of them. The primary goal was compatibility with existing Apple II software. According to Curtis Sasaki, the IIGS product manager, designing compatibility into the new machine involved creating an "Apple II on a chip," and was one of the most difficult design problems of the project. As it turns out, the IIGS runs every program that has

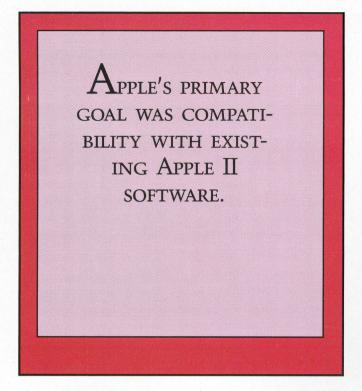
followed Apple's software development guidelines.

A second goal was speed. The IIGS can run in standard Apple mode, or, through a menu selection on its operating system control panel, it can run at 2.8 times standard Apple II speed. This speed was, according to Apple, the fastest Apple felt safe with while still being able to guarantee almost universal software compatibility. (Third-party accelerator cards offer 3.6 times the normal Apple operating speed, but must be disabled to run many programs.)

RAM access, a major stumbling block for Apple owners for many years, has been overcome with the 65816's 24-bit address bus, which allows direct access to 16 megabytes of RAM. Apple is offering memory expansion boards that allow you to install up to 8 megabytes of RAM in the IIGS's internal memory expansion slot.

Finally, users asked for better sound and graphics. They certainly got that: The IIGS graphics offer colors and resolution on a par with the best personal computers available today. And the sound—with 15 voices, digitally

continued on next page



sampled and running independent of the CPU—is the best anywhere.

What all this means is that Apple II lovers can now upgrade their machine's performance without sacrificing the things they've always liked, namely the Apple II's ease of use, expandability, reliability and huge software base. In fact, if you own a IIe, Apple will sell you a new motherboard swap that makes your older machine a IIGS.

#### NEW HOPE FOR SMALL BUSINESS

While small business owners prefer the simplicity of the Apple II series, they have been increasingly attracted by the more powerful, more businesslike software in the MS-DOS world. This attitude was helped along for the past couple of years by Apple itself, which, under Steve Jobs particularly, tried to promote the Mac as the company's sole business computer.

This Mac-in-business, Apple II-athome marketing approach led several one-time developers of business software for the II line to abandon the market completely. From accounting software companies like State of the Art and Great Plains to database and spreadsheet companies like Stoneware, Software Arts, and even Microsoft, the word was out that business applications had no future on the Apple II.

The IIGS should change all that. Among over 125 developers now working on software for the new machine, many are working on business applications, according to Tom Virden, Apple's home business marketing manager. Some products are under development by vendors who don't currently market Apple II software, and applications run from accounting to general business productivity to desktop publishing. The IIGS becomes even more attractive as a platform for business applications because its Maclike ROM routines make adapting Macintosh software relatively easy.

#### A NEW APPLE IN THE FAMILY

So how will Apple make room for the IIGS in its product line? Does this spell the end for the 8-bit Apple? The actual pricing on the IIGS was still secret at press time, but the new machine is expected to sell at about the same price as a "similarly-equipped IIe," which

means somewhere around \$1395. (See page 24 for price information.)

With a \$1395 IIGS, the prices of the IIe and IIc will probably drop by a couple hundred dollars. First-time users who want a cheap way into the Apple world should be able to pick up a IIc for under \$500 on the street, and the \$1395 price will be slightly below that of the low-end 512K Macintosh.

Buyers should instantly recognize the price/performance difference between the old and new Apple IIs, but Apple may have a temporary problem eliminating confusion about whether new buyers should opt for a low-end Mac or a IIGS. With its new graphic interface, the IIGS looks a lot like an expandable color Mac with a 12" monitor, and sales of 512K Macs may take a dive among small-business and professional users until the new Open Mac is released next year.

Despite the IIGS's new power, though, Apple still doesn't expect it to cannibalize the market for serious (read: corporate) business users. Rather, Apple expects the machine to go to small business owners who want to upgrade from their current Apple II technology, to the more well-heeled

home buyers who want the finest in graphics and sound for the kids, and to schools who want (and can afford) to take advantage of the new hardware for extra educational purposes, such as natural-sounding speech synthesis integrated into software that teaches reading.

#### BAD NEWS FOR THE COMPETITION

As far as its competition goes, the IIGS will spell trouble for some, and probably won't affect others very much at all. The IIGS is an excellent counterpunch against Tandy and IBM's more aggressive pursuit of the educational market. Schools (particularly high schools) have been clamoring for more power, and now they can get it without initiating teachers and students in the mysteries of MS-DOS. On the other hand, individuals and small businesses who now buy IBM versus Apple technology do so for reasons the IIGS isn't likely to alter-most of them want a particular software package or complete compatibility with other MS-DOS machines.

In its traditional strongholds among small business owners and home users. however, the IIGS could ruin Commodore and Atari's hopes of eroding Apple's market share. While both the Amiga and Atari ST are probably technologically superior, they don't have much of a visible edge performance-wise, and the average buyer is unlikely to realize the difference. What buyers will see is this: The IIGS comes from a rock-solid company, with thousands of existing software programs and newfound developer interest, while the Amiga and ST have comparatively little software, and come from companies whose makers have had their share of financial problems.

#### NEW LIFE FOR THE OLD APPLE II

By providing compatibility with most existing Apple II programs, Apple holds out a profound incentive for current Apple lovers to stick with a favorite. If current users don't opt for a whole new machine, the logic board swap should be cheap enough (\$500-\$700) to be worthwhile. Since the new logic board has built-in interfaces for the new disk drives and keyboard, older Apples can even get the new, detachable keyboard.

The decision to upgrade will, of course, be based on individual needs. Small business owners who want to take advantage of newer, more powerful software written for the IIGS will want to upgrade, and hobbyists who want access to the new machine's incredible sound and graphics will definitely line up for the new logic board. Schools with low-end applications (and low budgets) and individuals who don't need more power may well decide to stick with what they have. Apple doesn't have any plans to phase out the IIc and IIe, so those who stay in the 8-bit world won't be left out in the cold.

#### APPLE II FOREVER

In short, the Apple IIGS makes a lot of sense—from a business standpoint, from a user's standpoint, and from a technical standpoint. It won't be the cheapest computer on the block, but it won't require a second mortgage to own one, either. And once again, after languishing in a former technological generation, the Apple II is back as the friendliest, most technically capable computer in its class. When the Apple IIc was introduced, Apple held a media event to proclaim that the Apple II had an open-ended future. The IIGS makes that future undeniable.//

Charles Rubin's latest book, Command Performance: AppleWorks, was published in March by Microsoft Press. He is also the author of the best-selling AppleWorks and The Endless Apple, and writes about technology for a variety of publications.



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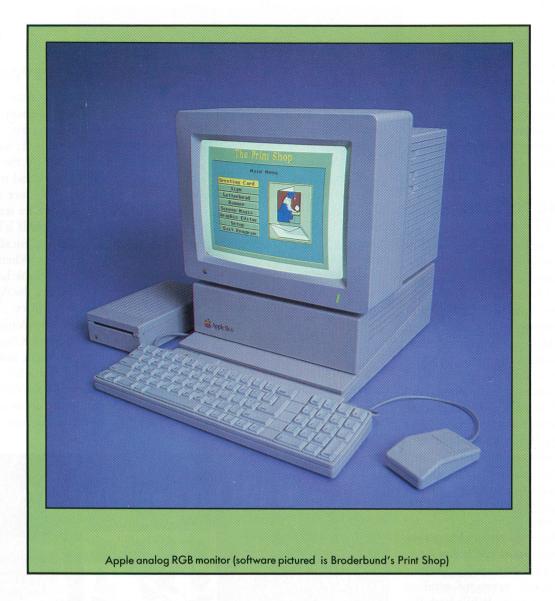
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issues which all parents will

issues which all parents will face as they start down the road toward computer literacy. \$12.95



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CIRCLE O11 ON READERS SERVICE CARD



# THE COMPUTER EVOLUTION

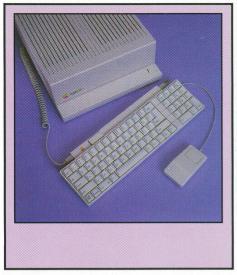
by FRANK HAYES and MICHAEL BIANCALANA PHOTOGRAPHY by MICHAEL JAY

hat's platinum, displays 4,000 colors, addresses megabytes of memory, and has the largest existing software base of any personal computer?

Hint: It's not a Cray in Apple II emulation mode.

It's the new Apple IIGS from Apple Computer, Inc.

This new member of the Apple II family is compatible with virtually all existing Apple II software. But it also has a faster 16-bit processor and more memory, better graphics and sound, Mac-like software tools and an instantly-available control panel.



#### THE COMPUTER

The Apple IIGS system comes in three pieces: a computer, an 80-key detached keyboard and a mouse. You'll also need a monitor and disk drives to use the computer.

The computer itself is housed in a high-impact plastic case with IIc-style grooves and a silver-white color Apple calls "platinum." Created by Frog Design, the people who designed the case for the IIc, the IIGS case contains no screws; you can take it apart and put it back together without using any tools at all.

Inside the case are the main circuit board containing the 65816 microprocessor, a set of custom integrated circuits, 256K RAM and 128K ROM, seven peripheral expansion slots and a special memory expansion slot. (See page 20 for a close look at the IIGS interior.)

The IIGS keyboard is something new in an Apple II: it's detached, and plugs into the back of the IIGS case, in the connector labeled "Apple Desktop Bus." The 10-key numeric pad will be a welcome addition for business users. The IIGS has IIc-style key caps and half-stroke touch instead of the full-stroke IIe-style keyboard that many people prefer.

For the first time, though, Apple II users may have real options in choosing a keyboard. Companies outside Apple will almost certainly offer a wide variety of keyboards and other input devices for the IIGS.

The Apple Desktop Bus lets you connect up to 16 input devices at once to the IIGS in a "daisy chain"—for example, the IIGS's one-button mouse plugs right into the keyboard. You could also connect a graphics tablet, light pen, or even another keyboard into the chain; the Desktop Bus will keep track of up to 16 different devices. Imagine a game in which each player has a keyboard—or a classroom with 16 keyboards on a single Apple!

#### **MONITORS**

You can use the Apple IIGS with a monitor or with an RF modulator and your TV set for display. There are two different video jacks on the back of the IIGS: one is a standard RCA monitor jack, and the other is Apple's video port.

The RCA monitor jack is for use with a monochrome monitor, a composite color monitor, or an RF modulator with a TV set. Any monitor that plugs into the monitor jack on earlier Apple IIs will work with the IIGS. But with the higher resolution of the new IIGS graphics modes (up to 640 by 200 pixels), composite color monitors may not give a clear picture; the bandwidth isn't high enough. The Apple video port is designed for Apple's new high-bandwidth RGB monitor, which will give a sharp display of the 4,096 colors available in 640-by-200 mode.

#### **DISK DRIVES**

Like the Apple IIc, the IIGS has no cassette port for program storage. Unlike the IIc, the IIGS has no built-in disk drive.

There are several different ways to connect disk drives to the IIGS. You can connect your Apple II-compatible 5½-inch floppy disk drives and Uni-Disk 3.5 drives in the same way you would with a IIc; just attach them in a line to the back of your IIGS. If you have a DuoDisk system for your IIe, you can use it with the IIGS by plugging your disk controller card into slot 6 inside the machine. Hard disks can connect through a plug-in interface card in one of the internal slots

Though the Apple IIGS doesn't

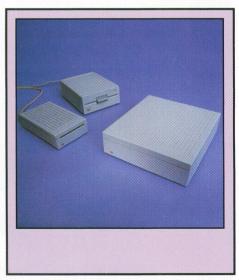
have a disk drive included, it *does* come with system software. It's supplied on 3.5-inch disks, and Apple is encouraging new users to use a UniDisk 3.5 with their systems. Of course, you can use 5½-inch drives with the IIGS. But the 800K drives have room for the larger programs that will use the full IIGS memory, as well as storage space for graphics in the new super hi-res modes. In fact, virtually all new software for the IIGS will be available on 3.5-inch disks—much of it available *only* in that format.

(For more information on Apple's new peripherals that are compatible with the IIGS, see page 24.)

#### MAKING THE CONNECTION

The back of the Apple IIGS resembles a collision between a IIe and a IIc. Like the IIc, there are built-in connectors; like the IIe, there are plastic knockouts for mounting connectors from internal cards.

There are eight built-in connectors (not including the power cord). There's a disk drive port, which is configured as slots 5 and 6—slot 5 for UniDisk 3.5 drives, slot 6 for floppy disks. There's an analog RGB video connector, and a regular NTSC composite



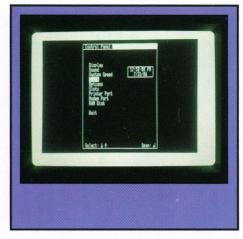
Apple's new 51/4-inch, 3.5-inch and hard disk drives

continued on next page

video connector. There's the Apple Desktop Bus connector for a keyboard, mouse and other input devices. There's a joystick port, and a sound jack for connecting headphones—the volume is under software control.

The two serial ports are designed for a printer and a modem; they represent slots 1 and 2. Either port can be configured to run a printer or modem; firmware lets the IIGS emulate the Super Serial Card and support a 64K printer buffer. Each serial port can also be connected to Appletalk, Apple's shared resource network; with special software, you can use the ports for other high-speed protocols, including MIDI (the Musical Instrument Digital Interface protocol).

Inside the case you'll find the seven slots familiar to IIe users. But many IIGS users will never need to fill those slots. An 80-column card is built into the IIGS, as is a clock—along with the



built-in interfaces for a serial printer, modem, mouse and disks. In fact, a IIGS with no slots filled is more fully loaded than many a IIe.

The slots are mainly designed to let you build a "non-standard" Apple with a parallel printer, for example, or a hard disk or video digitizer. The Apple II has traditionally been one of the most flexible computers available, and the IIGS continues that tradition.

#### THE CONTROL PANEL

Although there are both built-in interfaces and slots, to most Apple II software, there are still just seven slots in the IIGS. To choose between the built-in interface and the peripheral card you install, you can use a special ROM-based software accessory called the Control Panel.

By pressing CONTROL-OP-TION-RESET at almost any time, you can use the Control Panel to choose the interface in each slot—even while you're running another program. A few clicks of the mouse will electronically swap circuit boards and reconfigure your IIGS without ever opening the case.

You can also set the clock and the sound volume, select 40 or 80 columns, color or monochrome screen, and foreground and background colors; if you

Seen from the back, the IIGS has connectors for headphones, modem, printer, joystick, disk drives, RGB and composite color monitors, and the Apple Desktop Bus. There are also openings for connectors from internally mounted peripheral cards.



#### How much faster is the Apple IIGS?

That depends, of course, on the application. Some programs written specifically for the IIGS will take advantage of the powerful new 65816 instruction set to increase speed. Heavy use of high-res graphics slows things down, since hi-res uses slow graphics memory. Accessing a disk will take just about as long as ever.

But to get some idea of how the IIGS generally compares for speed with the Apple IIe, we ran an Applesoft BASIC version of a classic benchmark: Eratosthenes' Sieve. You'll find a listing for SIEVE in the Software Library on page 42, as well as on the Action Disk.

This special version of the sieve test uses hi-res screen memory to find all the prime numbers between 3 and 16,385. As a result, it tests speed for both regular and graphics memory to compare overall system performance. An ordinary Apple IIe took 42 minutes 23 seconds to run SIEVE. An Apple IIe with Applied Engineering's Transwarp speed-up card installed ran the same test in just 12 minutes 47 seconds—more than three times as fast.

The Apple IIGS ran SIEVE in 15 minutes 42 seconds. That means an Apple IIe with a speed-up card is still 20 percent faster than a IIGS! If you're just looking for raw speed to run existing Apple II programs, the IIGS isn't the fastest Apple II you can use.

But with its 65816 microprocessor and new ROM routines, the IIGS may run new software specifically designed for it much faster than equivalent software for the IIe, even with a speed-up card installed. And remember, the IIGS has special features—including expanded graphics capabilities—that aren't available on earlier Apple IIs at any price.

want black print on a white screen, it's easy to create using the Control Panel. You can choose slow (1Mhz) or fast (2.8Mhz) processor speed, install a RAMdisk, and change parameters for the keyboard, mouse and cursor.

The system parameters are stored in a 256-byte section of RAM powered by a battery, so your Control Panel settings are preserved when you turn off the computer.

#### **ProDOS**

The IIGS will run DOS 3.3 and Apple's Pascal operating system, but it's really designed to use ProDOS—and with good reason. Version 1.2 of ProDOS will let you use the Control Panel and connect your IIGS to an AppleTalk network. But there's more to it than that.

There are actually two different versions of ProDOS for the IIGS: ProDOS/8 and ProDOS/16. ProDOS/8 is the ProDOS you already know. The current version of ProDOS, version 1.1.1, runs fine on the IIGS,

"I CAN SEE ALL
THESE REALLY WILD
APPLICATIONS FOR
SCHOOLS—ONE
COMPUTER AND 16
KIDS, ALL PRESSING
THEIR KEYS AT THE
SAME TIME."
—CURTIS SASAKI.

and you'll be able to use ProDOS/8 on any Apple II.

IIGS PRODUCT MANAGER

ProDOS/16 is especially designed for the IIGS. For the programmer, it offers file handling and memory management capabilities far beyond what Apple's operating systems could do before, taking advantage of the power of the 65816 processor. For the user, it means faster disk operations—less time spent waiting for programs and data to load.

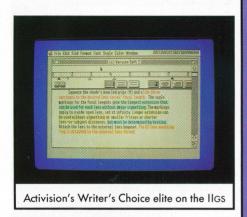
Unfortunately, ProDOS/16 isn't ready yet. Faced with a choice between introducing the IIGS with no new operating system (and thus no software taking advantage of the new features), or delaying the new machine, Apple chose a third route: a limited version of ProDOS/16. ProDOS/16 version 1.0 uses the new features of the IIGS—but it can't use them to their fullest, or at top speed. If all goes well, ProDOS/16 version 2.0—the *real* ProDOS/16—will be available early in 1987.

#### **GRAPHICS**

When it first appeared, the Apple II was unusual for its color graphics capabilities. A decade later, that's true again.

The Apple IIGS has all the graphics capabilities of an enhanced Apple IIe—including 80-column text and double hi-res graphics with a resolu-

continued on next page



tion of 560 by 192 pixels. There's also a pair of new super hi-res graphics modes: 320 by 200 and 640 by 200. These modes use their own 32K block of memory, with contiguous addressing and no page flipping. All screen animation must be done by very quickly redrawing the screen, but the 65816 processor is fast enough to make this possible.

In 640-by-200 mode each dot can be one of 4 colors, and in 320-by-200 mode each dot can be one of 16 colors. Unlike earlier Apple IIs, you can select which 4 or 16 colors the dots will be, and there are 4,096 different colors available to choose from. With the new IIGS super hi-res graphics, the Apple II family can march up to the front of the computer graphics line once again.

#### **APPLETALK**

When AppleTalk was first introduced on the Macintosh, it was little more than a long cable to connect the Mac to a LaserWriter. But AppleTalk has grown—it's now one of the most widely used local-area network systems. With the IIGS, the Apple II family can now join the network.

A local-area network lets different computers exchange information, send messages and use common peripherals—for example, a LaserWriter printer—that may be too expensive to provide for each computer. While sharing information may not be critical for home users, it's becoming increasingly important for business users, who often need to exchange information within an office.

AppleTalk may also become impor-

# "THE IIGS IS A HIGH END APPLE II. IT DOESN'T REPLACE ANYTHING—IT AUGMENTS THE APPLE II FAMILY." —RANDY BATTAT, IIGS HARDWARE PRODUCT MANAGER

tant for schools, which are a prime market for Apple II computers. Letting teachers connect up to every computer in a classroom could be a big advantage in keeping track of how students are doing.

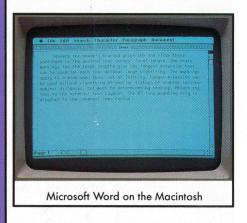
#### WHAT'S COME FROM THE MAC?

Inside and out, many Apple IIGS programs will closely resemble programs for the Macintosh.

Apple has encouraged software developers to create programs that follow Apple's Human Interface Guidelines—with the mouse-and-icon features that give the Macintosh its distinctive look. And the Apple designers who created the IIGS software interface worked hard to copy the style of the Mac, both at the programmer's and user's level.

As a result, the IIGS will have an extraordinarily wide range of software available. Not only will it run all existing Apple II software, but Macintosh software designers can translate their programs to work on the IIGS, so software that uses the advanced capabilities of the IIGS can become quickly available.

Like the Mac, the IIGS comes with a mouse, and the icon-oriented "desktop" is the item most clearly borrowed from the Macintosh. The similarities are obvious when you compare the desktop screens of the Mac and the IIGS: the windows, menu bar, mouse pointer and other standard features



make it hard to tell, at first glance, which screen belongs to which computer.

There are differences, of course: the Macintosh has 37 percent more pixels than the IIGS (512 x 342 versus 640 x 200). The IIGS has color, and can use larger monitors than the Mac's 9-inch screen. But the power of mouse-andicon software can now be harnessed on the Apple II for the kind of desktop publishing programs that until now have been the province of the Mac.

#### UPPER-LEVEL MANAGEMENT

Most users will never see the other things the IIGS has borrowed from the Mac. They're inside: the software tools that make it easy for programmers to use the mouse, windows, icons and menus.

The list reads like some strange corporate structure: Sound Manager, Control Manager, Window Manager, Menu Manager, Memory Manager, Event Manager, Desk Manager. Many of these tools are in the IIGS 128K ROM; others will load into RAM with ProDOS/16. Among the new features:

The *Tool Locator* serves as a central dispatcher for calls to all ROM- and RAM-based tools. The *Memory Manager* keeps track of free memory, and insures the IIGS's compatibility with older IIs by protecting soft switches and other special memory locations.

The Sound Manager contains a number of simple instrument-building and note-generating routines for the Ensoniq sound chip. And QuickDraw

continued on page 22



"Captain's Log, October 1, 1944. 0250 Hours. Fleet submarine USS Hammerhead proceeding Southwest at cruising speed. Our mission: intercept enemy convoy off the coast of Borneo. Disperse and destroy."

"0300 Hours. Two hours until dawn. Radar picks up convoy, escorted by two destroyers. We believe that one of the enemy's valuable cargo ships is part of convoy formation."



"0525 Hours. Torpedo rooms report full tubes forward and aft. Battery at full charge for silent running. We hope water temperature will provide thermal barrier to confuse enemy sonar."



"0715 Hours. Torpedo tubes 1, 2, 3 fired. Two destroyers hit and sinking. One of the enemy's last cargo ships coming into 'scope view — an ideal target position. On my mark... Fire Tube 4! Fire 5!"

# Actsion Radioble Captain's Log... War Date 10.01.44



"0400 Hours. Lookouts on the bridge. Target identification party reports one cargo ship, 4,000 tons, troopship of 10,250 tons, with two Kaibokan-type escorts. Moving into attack position.'



"0600 Hours. We are at final attack position. Convoy moving at 10 knots. Target distance decreasing rapidly ... Crash Dive! Escorts have spotted us and are turning to attack! Rig to run silent.'



"Superb" raves Scott May in On Line, "strategic intensity and heartpounding action have rarely been merged this successfully." Analog calls it flatly "the best submarine

simulation so far." Compute comments "Silent Service's detail is astonishing." Join the more than 150,000 computer skippers who have volunteered for **Silent Service**, the naval action/tactics simulation - from MicroProse.

Tandy 1000/IBM PC Jr. screens show



"0500 Hours. Sound General Quarters! Battle stations manned. Preparing for torpedo run. Gauge Panel OK. Periscope OK. Charts and Attack Plot Board OK. All mechanical systems OK." 7



"0700 Hours. Depth charged for one hour. Some minor damage, but repair parties at work. Destroyer propeller noises receding. We'll come to periscope depth for our return

Silent Service is available for Commodore 64®128™, Amiga<sup>™</sup>, Apple II family, Atari XL/XE, Atari ST, IBM PC/PC Jr, and Tandy 1000, at a suggested retail price of \$34.95 (Atari ST and Amiga, \$39.95).

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Available from your local retailer. If out-of-stock, contact MicroProse directly for further information on our full range of simulation software, and to place Mastercard/Visa orders.



CIRCLE 065 ON READERS SERVICE CARD

A prototype of the IIGS main circuit board. On this prototype, a piggyback circuit board obscures the 128K ROM, 128K slow RAM and Sound GLU. This prototype also has the optional Apple IIGS Memory Expansion Board installed in the memory slot.

#### **Expansion slots**

These seven slots are compatible with the IIe.

#### **SlotMaker**

The SlotMaker timing chip generates control signals to make the IIcs slots act exactly like slots on earlier Apple IIs.

#### 128K fast RAM

Runs at the full IIGS speed.

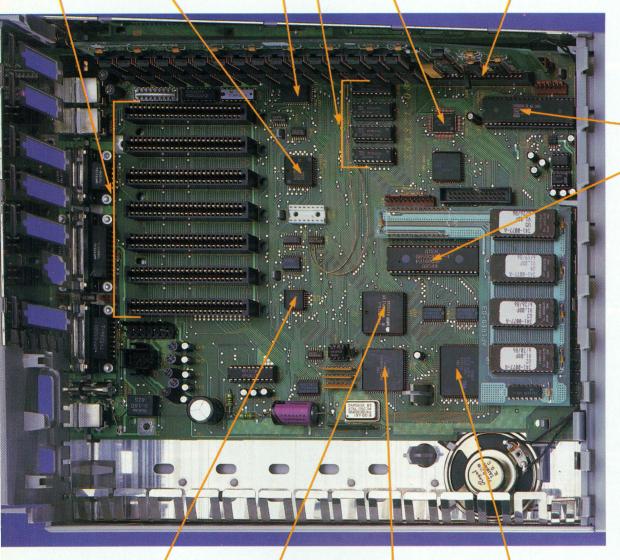
#### SCC

#### **Keyboard GLU**

The Keyboard
General Logic Unit
interfaces the
keyboard and mouse
to the system through
the Apple Desktop
Bus.

#### Memory expansion slot

This dedicated memory slot can be used to add up to 1 megabyte of ROM and 8 megabytes of RAM.



#### Ensoniq sound chip

#### 65816 microprocessor

#### **128K ROM**

Ten times the amount of ROM on the IIe, it contains BASIC along with the Control Panel and the software tools that make many of the new IIGS features possible.

#### 128K slow RAM

Mimics the Apple II's 1 MHz memory speed.

#### Sound GLU

The interface between the Ensoniq sound chip and the rest of the circuitry lets the Ensoniq run independently of the CPU.

#### **ÍWM**

The ''Integrated Woz Machine'' handles disk operations for floppy and 3½-inch disks.

#### FPI

The Fast Processor Interface controls system speed—it can slow the IIGS down to normal Apple II speed for games or other time-critical software. The FPI also controls input/output access and memory shadowing—the feature that lets the IIGS work just like an Apple IIe or IIc.

#### VGC

The Video Graphics Controller supports all Apple II graphics modes, including super hi-res. It also handles foreground, background and border colors on the screen. Mega II

# INSIDE THE APPLE IIGS

#### SURFACE-MOUNT TECHNOLOGY

Many of the IIGS chips are not just soldered to the surface of the main circuit board—they're a part of it. Surface-mount technology makes the IIGS more reliable. If one of the key chips goes bad, though, repairing the main circuit board will be next to impossible. In that case, your dealer will have to replace the entire board.

#### THE WDC 65816 MICROPROCESSOR

The brain of the IIGS is the Western Design Center's 65816 microprocessor. Designed as a next generation for the Apple II's 6502 CPU, the 65816 can run all existing Apple II programs. With its 2.8 MHz clock speed, the 65816 runs nearly three times as fast as the 65C02 on a IIe, and uses a 24-bit address bus—that means it can handle up to 16 million bytes of memory, more than 200 times what a 6502 can use directly.

The 65816 doesn't have the reputation for brute power that some microprocessors have; for example, it doesn't have multiply and divide instructions, like the Macintosh's 68000 CPU. However, the 65816 has a big advantage: it's fast. Each 65816 instruction executes very quickly. As a result, a 65816 can perform some operations—such as moving things around on a computer's screen—faster than other 16-bit chips.

#### THE MEGA II

When Steve Wozniak designed the Apple II, his goal was to create the most powerful, functional computer he could from the smallest number of inexpensive parts then available. Over the years, Apple engineers have taken parts of Wozniak's original design and shrunk them down to fit on individual chips. One example is the IWM ("Integrated Woz Machine") disk-controller chip, which combines nearly all the circuitry of a IIe disk-controller card into a single chip on the IIc.

But now Apple has performed what may be the ultimate shrinking of the original Apple II design. The new Mega II chip could be called "an Apple II on a chip"; this single integrated circuit contains most of the circuitry of a basic Apple II. The Mega II replaces the MMU, IOU, TMG, GLU, and video logic from the IIe and IIc with a one chip. It also handles game paddles and the mouse, provides composite and RGB video signals, and contains a character generator for eight languages.

With just a Mega II, a CPU, some memory and a few other chips, you can build an Apple II. In fact, that's what Apple will be doing soon: the next generation of the Apple IIe and IIc will use the Mega II, making them more reliable and less expensive.

#### THE SCC SERIAL CONTROLLER

The Zilog Z8530 Serial Communications Controller is a powerful twochannel serial chip that can handle data at up to a million bits per second. Software in the IIGS ROM lets the SCC emulate Apple's Super Serial Card and support a 64K printer buffer.

Because the SCC is also the serial chip used in the Macintosh, many Mac peripherals will be hardwarecompatible with the IIGS. Of course, the IIGS can't run Macintosh software: it will still require its own software to make the peripherals work.

The SCC also lets the IIGS connect to AppléTalk, Apple's high-speed shared resource network. Up to 32 AppléTalk devices — computers, disk drives, printers and modems — can all be connected together. In addition, the SCC can handle the MIDI music protocol, and even the complicated protocols that are required to connect directly to mainframe computers.

#### THE ENSONIQ SOUND CHIP

A 15-voice sampling sound chip with 64K of dedicated RAM, the sound chip in the Apple IIGS was originally intended to be an optional extra. Made by Ensoniq, it's the same chip that forms the heart of Ensoniq's Mirage keyboard.

It's not a conventional synthesizer. Instead of creating sounds, it stores sound waveforms in memory and then plays them back like a tape recorder—as many as 15 different sounds at a time, reproduced perfectly. And, unlike the sound you get from a IIe or IIc, the IIGS sound is independent of the CPU. The Ensoniq chip can create music or sound effects without slowing down any other program that's running.

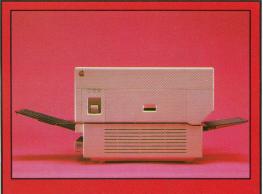
There are software tools in the IIGS ROM for generating simple musical tones. An audio input/output connector on the logic board makes it possible to input sounds directly into your IIGS. And the IIGS can store digitized sounds on a disk, then play them back later. Apple has licensed all of the waveforms available for the chip from Ensoniq, and may offer them either to software publishers or users.//

THE COMPUTER EVOLUTION continued from page 18

II lets you put circles, squares, lines and color fills on the super hi-res screen—it's critical for using windows with the IIGS.

The Event Manager allows programs to monitor mouse and keyboard action for use with windows and icons. The Desk Manager keeps desk accessories like clock, calculator, notepad and address book available within a few keystrokes inside any program. The Menu Manager aids in creation of menus and then monitors the users choice of items on the menu. The Window Manager does windows, keeps track of position and size of windows on the screen. The Control Manager displays, hides, and monitors on-screen controls like buttons, check boxes, and scroll bars.

LineEdit is a mouse-based text editor similar to Macintosh's Text Edit. It features user-programmable function keys along with most standard text processing functions like vertical and horizontal scrolling, insert and delete, cut and paste, search and replace, and an undo function in case you make a



With AppleTalk, the IIGs can send print information to the LaserWriter at 230,400 bits per second.

mistake.

Although these tools are designed for use by applications programmers, Applesoft BASIC programmers will be able to use some of them through ampersand-routine packages available from Apple.

Does this make the IIGS the new king of the Apple hill? It's hard to say—there are rumors that a color Macintosh is in the works, too. But for the moment at least, the spotlight is on the Apple IIGS.

#### RECYCLING CENTER

Which peripherals from your old Apple II system can you use with your new

Apple IIGS? What software will work on it? In short, what will still work with the new machine?

Software first: According to both Apple and independent developers, virtually all Apple IIe software will run on the IIGS. For example, AppleWorks, MouseWrite, Word-Perfect, Pinpoint, and such games as Ogre and Auto Duel work without problems. The number-one goal of the IIGS designers was software compatibility with earlier Apple IIs, and they worked hard to meet that goal

The one type of Apple II program the IIGS generally won't run is telecommunications. The ACIA serial chip that's part of the IIc and the Super Serial Card has been replaced in the IIGS by the Zilog SCC. The SCC is a much more powerful controller than the ACIA, and it can handle high-speed serial protocols such as AppleTalk, MIDI (the Musical Instrument Digital Interface protocol)—even direct connections to mainframes.

But because the SCC and ACIA chips are very different, Apple II telecontinued on page 24

#### **SPECIFICATIONS**

**Microprocessor**: Western Design Center 65816 (includes superset of 6502 instructions) running at 1 MHz or 2.8 MHz clock speed; 16-bit registers; 8-bit data bus; 24-bit address bus allows addressable memory space of 16 Mbytes.

**ROM**: 128K, user-expandable to 1 Mbyte

**RAM**: 256K, user-expandable to 8 Mbytes

#### **Special support chips:**

Mega II (Apple II MMU, IOU, character generator, TMG timing generator, video logic, GLU)
IWM disk controller
Video graphics controller
Fast processor interface
Sound GLU
Keyboard GLU

Zilog 8530 serial communications controller

SlotMaker expansion slot controller

**Operating systems**: ProDOS/8, ProDOS/16, DOS 3.3, Pascal; others with coprocessors

Clock: Built in, ProDOS compatible

**Expansion slots**: 7 standard input/output slots; 1 dedicated memory expansion slot

**Keyboard**: Lightweight detached 80key keyboard, including 10-key numeric keypad; connects through Apple Desktop Bus

**Mouse**: One-button, mechanical; connects through Apple Desktop Bus

#### Graphics display:

40×24 text 80×24 text 40×48 graphics, 16 colors 80×48 graphics, 16 colors 140×192 graphics, 6 colors 280×192 graphics, monochrome 140×192 graphics, 16 colors 560×192 graphics, monochrome 320×200 graphics, 16 colors per line (4,096 colors total) 640×200 graphics, 4 colors per line (4,096 colors total)

**Sound**: Ensoniq 15-voice sampling sound chip (32 oscillators, 64K dedicated RAM) operates independently of CPU

Network capability: AppleTalk

#### Interfaces:

NTSC composite color video output Analog RGB video output Mono audio output (8 ohm, volume under program control)
Apple Desktop Bus input (keyboard, mouse, etc.)
SmartPort disk interface (51/4-inch and 31/2-inch drives)
Two serial ports (RS-232, AppleTalk)
Game/joystick port
Audio input/output (on logic board)

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THE COMPUTER EVOLUTION continued from page 22

com programs that try to directly control the serial chip won't work on the IIGS—and that includes most of them, including Apple's own Access II. Fortunately, updated versions or patches should soon be available to make these programs work on the IIGS. And remember, if you recycle the Super Serial Card from your IIe, your telecommunications software will be 100 percent compatible with it.

As for hardware, you probably won't need most IIe peripheral cards with the IIGS. Since serial printer, communications, disk and mouse interfaces are built in, along with 80-column capability and a clock, many of the slots you had to fill on your IIe can now go empty.

If you have a DuoDisk system for your IIe, you can use it with the IIGS by plugging your disk controller card into slot 6 inside the machine and selecting it from the Control Panel. A parallel printer interface card should work as it did with the IIe—again, just plug it in and select it from the Control Panel.

A Z-80 coprocessor card (for running CP/M programs) will only work if it doesn't do *direct memory access* (DMA). The same is true of coprocessor cards with 68000, 8088 or other processors. Check the manual for your coprocessor card to find out if it does DMA.

Speed-up cards won't work on the IIGS. A speed-up card has its own microprocessor onboard; in the IIGS,

it would be something like replacing the 65816 processor with an old 6502.

Finally, there's the ultimate in IIe hardware recycling: If you've got an Apple IIe and you'd like to reuse your keyboard and case, you can have your computer upgraded to a IIGS by an authorized Apple dealer. The dealer will take out your IIe's main circuit board and replace it with a version of the IIGS board. That's less expensive than buying a complete IIGS, and the upgraded machine will work just like a regular IIGS, but with the familiar beige case and built-in keyboard. (Sorry, but there's no similar upgrade for the Apple II, II+ or IIc.)

#### WHAT'S NEW?

To make full use of the new super hires graphics on the IIGS, you may want to invest in a new monitor. Apple's new 12-inch RGB monitor is designed to display the new graphics at their clearest. The new monitor is specifically designed to work with the IIGS; it has a high-contrast black matrix, and gives a sharp display of the 4,096 colors available in 640 by 200 mode on the IIGS. It plugs directly into the back of the IIGS.

Apple is also introducing a new 12-inch black-and-white monitor. The monochrome monitor has a high-contrast anti-glare screen, and a high bandwidth that's perfect for displaying super hi-res graphics in monochrome. Like the new RGB monitor, the monochrome monitor is specifically designed to work with the IIGS, though it will also work with any other member of the Apple II family.

Apple has a new 5½-inch floppy disk drive in the IIGS platinum color—you can plug it into the disk drive port on the back of the IIGS. The new floppy drive also works with the IIc. Apple also has a new UniDisk 3.5 drive that works with both the IIGS and the Macintosh (though not with the IIc or IIe). Again, it matches the IIGS platinum color, and plugs directly into the IIGS disk port.

And Apple is introducing a 20megabyte hard disk that connects to the IIGS through a standard interface "There are two and a half million Apple IIs out there. We wanted to make sure there was an upgrade path for them."

—JOHN SCULLEY, PRESIDENT, APPLE COMPUTER, INC.

called SCSI (Small Computer Standard Interface); once again, it just requires plugging a card into a slot

An Apple IIGS Memory Expansion Card can increase the RAM in your IIGS to more than a megabyte—a big advantage for using large programs. And as larger RAM chips become available, you'll be able to put up to 8 megabytes of RAM in your IIGS, along with up to a megabyte of ROM.

You may need a new telecommunications program, but all other existing DOS 3.3, ProDOS and Pascal programs should work as they always did on your IIe or IIc. There's a new version of ProDOS that's specifically designed to take advantage of the new power of the IIGS—ProDOS/16, version 2.0. Watch for it at the beginning of 1987. And of course there's lots of new software on the way that's specifically designed for the IIGS—as you'll see in the pages to come.//

Frank Hayes is Assistant Editor of II Computing. Michael Biancalana is Programs Editor of II Computing.

At press time, the price of the Apple IIGS without monitor or disk drives was set at approximately \$1000. For complete price information and to see the IIGS in action, see your Apple dealer. You can get the location of the Apple dealer nearest you by calling 1-800-538-9696.

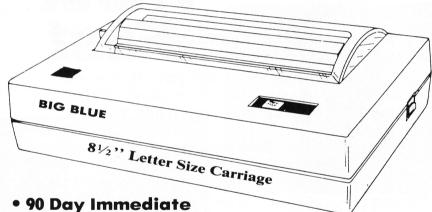
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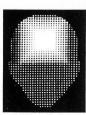
ThinkFast presents a series of Left and Right Brain trials that increase in difficulty. Choose how fast and long you want your session to be... then concentrate. Alphanumeric and picture block sets appear. Complete trials by determining if the sets are the same or different, copying them, or recreating them from memory. A complete session reporting system lets you watch your progress.



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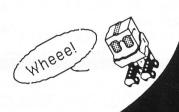
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# IIGS PRODUCTS

#### Mice and Color Lead in Software

by ANITA MALNIG, Editor

evelopers are pleased; they like the IIGS: the classy color, the speed, the sound. However, just about everyone wishes Apple had equipped it with 512K.

As I write this, all the software mentioned here is under development. Therefore, while we saw several demos, this is not a product review. Look forward to comparative reviews in upcoming *II Computing* issues.



PAINTWORKS PLUS (ACTIVISION)

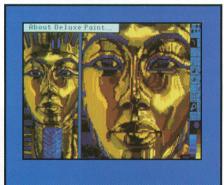
So far IIGS software ranges from folksy to sophisticated home software to business applications to education to desktop publishing. Some works are original, others already exist on other machines, and most software comes on  $3\frac{1}{2}$ -inch disks.

#### PAINT PROGRAMS

Paint programs popped up first, with three coming out from Activision, Electronic Arts and Polarware.

**PaintWorks Plus** (Activision/Version Soft) is a joy to behold. The colors OCTOBER / NOVEMBER 1986

are simply stunning and you can animate them as well. As marketing vice president, Bill Cleary said, "It's like having Fantavision and a color Mac-Paint in one program."



DELUXE PAINT (ELECTRONIC ARTS)

#### "We're committed to developing for the IIgs."

BING GORDON, ELECTRONIC ARTS

**Graphics Magician** from Polarware/Penguin is a longstanding classic in the Apple II world. Now it will be enhanced and enlarged and take advantage of the IIGS's speed.

Electronic Arts is bringing its **Deluxe Paint** for the Amiga to the IIGS, despite the fact that "the extra graphic chip on the Amiga gives [that] machine more graphics power," says Bing Gordon of EA. Deluxe Paint is gorgeous on the Amiga and we're look-

ing forward to it on the IIGS.

#### PAGE LAYOUT

Many of us II users have been longing for desktop publishing. It's here in several forms; how these forms challenge the Mac no one knows yet.

**Quark**, which brought us Catalyst, introduces integrated software for desktop publishing. Integrate Microsoft Word, Page Maker and MacDraw and



EXPLORE-A-STORY (LEARNINGWAYS)

you've got, says Fred Ebrahimi, an idea of what's being offered. It's possible to design large documents, and it has better line and border capability than Page Maker. It supports the LaserWriter.

**PageWorks** from Megahaus is intended to let you integrate text and graphics on one page to produce high quality documents on Apple's Image-Writer and LaserWriter. It's standalone software compatible with Apple-Works, probably good news to many.

While Megahaus has targeted Page-Works for the small business or school, **Broderbund**'s page layout program is designed expressly for the home user. "How wonderful the result, how minimal the effort," is the phrase they've had in mind for it, says Alex Hoag.

#### **EDUCATION**

Explore-a-Story, developed by Learningways, Inc., is for grades K-4 with supplemental reading program storybooks and accompanying software. The children mouse around with software that graphically contains many of the elements from the storybooks. Characters jump, wave, run and

# "It's great they didn't make orphans of IIe software."

FRED EBRAHIMI, QUARK

walk across the colorful IIGS screen. The company is also working on a non-fiction package with the Boston Science Museum.

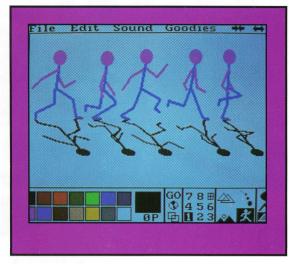
PBI's **Animation Reader** for three-to-five-year-olds, uses liberal color and digitized voice. The voice you hear describes or explains the super hi-res picture you see on the screen.

**Polarware** is bringing their interactive fiction series to the IIGS with more color and sound effects. They're also creating new interactive stories that will be educational, using geography and science, although as Mark Pelczarski says, "The kids may not know it while they're playing the game."

#### **BUSINESS**

Chang Labs is already doing well with **Rags to Riches** on the Mac and they're looking forward to a healthy business for the IIGS. Right off the bat, Dash Chang, president of the company, advises users to get more memory.

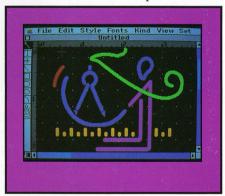
Ledger, payable and receivables are the three modules and they're available in the "Retail 3-pack," "General



FANTAVISION (BRODERBUND)

Business 3-Pack," and "Professional 3-Pack."

With **Visualizer** from PBI you've got a business graphics package that uses AppleWorks spreadsheet data. It lets you graph information into more than seven types of hi-res color graphs. It even allows for an "exploding pie." It prints out in color to the ImageWriter and is LaserWriter compatible.



THE DRAWING TABLE (BRODERBUND)

#### "I like the IIgs a lot."

ALEX HOAG, BRODERBUND

MECA has made a name for itself with Andrew Tobias's **Managing Your Money**, and that's what's debuting on the IIGS. This version is identical to the IBM version 2 with graphics, speed and support for a hard disk.

What would the IIGS be without a Lotus clone? That's what we've got

from **VIP** Technology—a combined spreadsheet, database and graphics program. It's fast, says spokesman Tom Nelson, uses color and has a mouse interface. (You can get it for the IIe.)

#### WORD PROCESSING

Activision is the first company with an original word processor. Called **Writer's Choice elite**, this program is very Mac-like. You choose fonts and colors, and you can work with 16 windows open at once. It's impressive.

Writer's Choice and Paint-Works Plus are compatible.

Roger Wagner Publishing is bringing **MouseWrite** to the IIGS. It's one of the few programs that won't need

# "We love the machine."

BILL CLEARY, ACTIVISION

256K. The same program will run on the IIe; it will just use IIGS capabilities when on the IIGS. On the IIGS, it will support print spooling, the large RAM and the UniDisk. A separate module will offer LaserWriter support.

#### **TELECOMMUNICATIONS**

Comworks I, PBI's telecommunications package on the market for the IIe, is compatible with the IIGS. When ProDOS/16 is complete, the company will come out with Comworks 16, which will be IIGS specific. This program will have a faster transfer rate and you can upload and download simultaneously.

#### ANIMATION

**Deluxe Video** is part of the Amiga Deluxe series which Electronic Arts is bringing to the IIGS. It will allow for ease of transfer between the computer and VCRs.

**PaintWorks Plus** from Activision includes animation ability. You can draw up to 20 frames changing each a little bit, then let your animated picture unfold.

Broderbund will be bringing **Fantavision** to the IIGS with enhanced graphics and sound effects.

#### **PRINTING**

Again from Electronic Arts comes **Deluxe Print**, already out for the Amiga. I hope its ease and sophistication will translate nicely.

Broderbund's famed **Print Shop** will be a treat on the IIGS.
It offers eight solid colors, super hi-res graphics with multiple graphics on one card or sign.
After many requests Print Shop will include a page preview.

#### DRAFTING

The lone one, so far, in this category is **The Drawing Table** from Broderbund. Hoag says, "It's like MacDraw with color." I saw this impressive drafting tool which will drive the Laser-Writer, create polygons, arcs, round corners of rectangles, adjust border sizes, resize graphics and more.

#### **MUSIC**

**Deluxe Music Construction Set**, Electronic Art's Macintosh program, is coming to the IIGS.

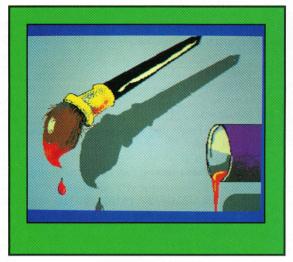
#### UTILITIES

From Roger Wagner Publishing we'll see Merlin 16, a 65816 macro assembler for developing assembly language routines on the IIGS. The company is also releasing Carousel, a program like Mac's Switcher. Ported from the Macintosh by TML Systems is a Pascal compiler called TML Pascal.

#### **HARDWARE**

Orange Micro has several products to offer. **ProGrappler** is a parallel interface card for the IIGS that will allow snapshot capability as part of the IIGS's desktop accessories. You'll be able to freeze a program in progress, print out what's on screen, then resume printing.

RamPak 4 GS is their memory expansion card with 512K, expandable to four megabytes. Orange Micro is also offering System Sentinel which



PAINTWORKS PLUS (ACTIVISION)

is an overall maintenance system telling you when to service the different parts of your machine.

AST Research has four IIGS hardware products: **SprintDisk**, an I/O memory expansion board that expands to one megabyte. Already available for the IIe, it has RAMdisk and cache memory capacity. Cache memory may not be as fast as a RAMdisk, but, as AST's Ashe Jain says, it's "user transparent."

"APPLE HAS DONE A
NICE JOB BUILDING A
GOOD COMPUTER. IT
KEEPS THE LINE AS
ONE OF THE STRONGEST COMPUTERS OUT
THERE."

Mark Pelczarski, Polarware

The **AST 2000** is a 20-megabyte hard disk drive that comes with a 20 megabyte tape backup. It supports ProDOS, Pascal and DOS 3.3 and is the same hard disk as for the Macintosh and IIe.

Entirely IIGS specific from AST is a memory expansion card, expandable to four megabytes and a graphics board which will capture images from sources such as video cameras or VCRs.

### PRODUCT AND COMPANY INFORMATION

All the companies said products would ship at announcement of the IIGS, or within a month thereafter. We've listed the prices that were available at press time.

#### **ACTIVISION**

2350 Bayshore Pkwy. Mountain View, CA 94039 (415) 960-0410

PaintWorks Plus, \$79
Writer's Choice elite, \$99
CIRCLE 223 ON READER SERVICE CARD

#### **AST RESEARCH**

2121 Alton Ave. Irvine, CA 92714 (714) 553-0340 (714) 660-9175 (BBS)

SprintDisk, \$295 AST 2000, \$2795 Memory Expansion Board Graphics Board CIRCLE 224 ON READER SERVICE CARD

#### **BRODERBUND**

17 Paul Drive San Rafael, CA 94903 (415) 479-1700

Page Layout Program (unnamed at press time)
The Drawing Table
The Print Shop
Fantavision
(all products under \$100)
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#### **CHANG LABS**

5300 Stevens Creek Blvd. San Jose, CA 95129 (408) 246-8020

Rags to Riches \$200 per module; \$500 for 3-pack CIRCLE 226 ON READER SERVICE CARD

#### **ELECTRONIC ARTS**

1820 Gateway Drive San Mateo, CA 94404 (415) 571-7171

continued on next page

The Deluxe Series: Paint, Video, Print, Music approx. \$99 each CIRCLE 227 ON READER SERVICE CARD

#### LEARNINGWAYS, INC.

875 Main St. Cambridge, MA 02199 (617) 576-3007 Distributed by D.C. Heath 125 Spring St. Lexington, MA 02173

Explore-a-Story, (51/4-inch disk) CIRCLE 228 ON READER SERVICE CARD

#### **MECA**

285 Riverside Ave. Westport, CT 06880 (203) 222-1000

Managing Your Money CIRCLE 229 ON READER SERVICE CARD

#### **MEGAHAUS**

5703 Oberlin Drive San Diego, CA 92121 (619) 450-1230

**PageWorks** \$125 CIRCLE 230 ON READER SERVICE CARD

#### **ORANGE MICRO**

1400 N. Lakeview Ave. Anaheim, CA 92807 (714) 779-2772

ProGrappler, \$129 **RAMPak** System Sentinel CIRCLE 231 ON READER SERVICE CARD

#### **PBI**

1111 Triton Dr. Foster City, CA 94404 (415) 349-8765

Comworks I \$95 Comworks 16 \$59 Animation Reader \$39.95 Visualizer CIRCLE 232 ON READER SERVICE CARD

#### **POLARWARE/PENGUIN**

P.O. Box 311 Geneva, IL 60134 (312)232-1984 **Graphics Magician** Interactive Fiction Series CIRCLE 233 ON READER SERVICE CARD

#### **QUARK**

2525 W. Evans Denver, CO 80219 (303) 934-2211 Desktop Publishing Package (unnamed at press time) Under \$300 CIRCLE 234 ON READER SERVICE CARD

#### ROGER WAGNER PUBLISHING

10761 Woodside Ave., Ste. E Santee, CA 92071 (619) 562-3221

MouseWrite, (51/4-inch disk) Merlin 16 Carousel CIRCLE 235 ON READER SERVICE CARD

#### **TML Systems**

4241 Bay Meadows Rd. Jacksonville, FA 32217 (904) 636-8592

TML Pascal \$99.95 CIRCLE 236 ON READER SERVICE CARD

#### **VIP Technology**

132 Aero Camino Santa Barbara, CA 93117 (805) 968-4045

Combination spreadsheet, graphics, database (unnamed at press time) CIRCLE 237 ON READER SERVICE CARD



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counts the excitement of the Apple Computer Clubs' Competition '84 in which hundreds of teens gained national \$10.95 recognition.

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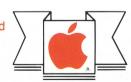
resource book filled with activities on word processing computer graphics, LOGO, and other stimulating subjects.

**Apple Computer Clubs** Parent's Guide addresses issues which all parents will face as they start down the road toward computer literacy. \$12.95

Please enclose a copy of this offer with your order and add \$2.00 per book for shipping and handling. Thank you. Claire Christian

Apple Computer Clubs International 217 Jackson Street, Box 948 Lowell, MA 01853

For more information, call 1-800-343-1425.



Apple<sup>®</sup> Computer Clubs International

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#### **SNEAK PREVIEW**

#### Talking Text Writer and the IIGS

by ANITA MALNIG, Editor

TALKING TEXT WRITER
Scholastic Software
730 Broadway
New York, NY 10003
(212) 505-3000
256K, IIGS
128K, Ile or IIc
\$249.95 with Echo Speech
Synthesizer from Street
Electronics
(discount available for schools)
CIRCLE 222 ON READER SERVICE CARD

"[The IIGS] is just the machine that special ed and primary grade teachers have been waiting for," says Dr. Terri Rosegrant, a Ph.D. in early childhood education and linguistics. She's the developer of **Talking Text Writer** from Scholastic.

And *Talking Text Writer* just might be the *software* that special ed and primary grade teachers have been waiting for. It talks, it writes, it draws and it's easy for young children to use. Studies have shown that the program has increased children's interest and ability in reading and writing.

It talks with the help of an Echo Speech Synthesizer. You have the option to choose whether Talking Text Writer will speak the word(s), sentence(s) and paragraph(s) that you write on the monitor's screen.

Since Talking Text Writer uses synthesizers, not euphonic speech, you must make phonetic adjustments. For instance, for my name, Anita, we told the program to say, A-nee-ta, and it did so, quite nicely. The program then remembers the pronunciation.

"A socket for a speech chip would have helped [in the IIGS]," says Rosegrant.

While the new Ensoniq sound chip in the IIGS can make wonderful sound, it's not, says Rosegrant, designed for speech. Speech is duplicated with the new chip but only by digitizing each word, which takes up a lot of memory. Thus, Rosegrant and Talking Text Writer's programmer, Russ Cooper, say the program will continue using the Echo board in the IIGS and the IIe as well. (The program will also be available in a IIe version.)

Talking Text Writer seems simple enough to write with (I had only a brief demo in someone's office). A border of commands surrounds the screen, and you can change those borders easily by the press of a number. You do simple word processing on a screen whose color you can change. Talking Text Writer yields a 20-, 40- or 80-column screen and print-outs, and offers a wide variety of printer functions. A special underlay function lets you define words and save those definitions. A teacher can go in ahead of time to define certain words; when students

Talking Text Writer just might be the software that special ed and primary grade teachers have been waiting for. It talks, it writes, it draws and it's easy for young children to use.

get to that word they give the command to see the definition. They can then choose to read it and/or have Talking Text Writer do the reading.

It draws. The IIGS version offers a library of pictures. Taking advantage of the stunning IIGS visual display, children can write and illustrate their own stories.

Talking Text Writer will store those pictures and text with the increased storage capacity, both in RAM and with 3½-inch disks. Rosegrant also sees the detached keyboard as a real plus for young children who are sharing a computer.

Talking Text Writer has been a long time in the making. Rosegrant realized it was beginning readers and writers who had the most difficulties, and with those youngsters in mind she



designed this program. She developed the original prototype in 1981 on the IBM PC. IBM offered funding for test sites in Phoenix, Arizona, with Chapter One children (children educationally at risk because of environmental factors). These children were hard to teach. With her program they learned to read and write. If I got a charge out of hearing this program speak my sentences, I can imagine the possibilities with five-year-olds!

Rosegrant feels there's a real gap in Apple II software for kindergarten and primary grades, and hopes Apple will encourage development in that area. IBM's "Writing to Read" program, specifically geared to those very ages, is gaining momentum in the domain usually considered Apple's.

Talking Text Writer is an exciting move ahead. The combination of it with the IIGS opens up countless doors for many.//



CIRCLE 130 ON READERS SERVICE CARD

#### **REVIEWS**

#### Programming the 65816: A Review of Three New Texts

by JEFF HURLBURT

65816/65802 ASSEMBLY LANGUAGE PROGRAMMING by Michael Fischer Osborne/McGraw-Hill 2600 Tenth St. Berkeley, CA 94710 (415) 548-2805 \$19.95

CIRCLE 238 ON READER SERVICE CARD

PROGRAMMING THE 65816 by William Labiak Sybex, Inc. 2344 Sixth St. Berkeley, CA 94710 (800) 227-2346 \$24.95

CIRCLE 239 ON READER SERVICE CARD

PROGRAMMING THE 65816
MICROPROCESSOR: INCLUDING
THE 6502 AND 65C02
by Ron Lichty and David Eyes
Prentice-Hall
Englewood Cliffs, NJ 07632
(201) 592-2240
\$22.96

CIRCLE 240 ON READER SERVICE CARD

Apple's adoption of Western Design's 65816 as the heart of its new IIGS computer has, naturally, spawned a host of "How to Program . . ." paperbacks. This month we shall take a look at three new releases contending for recognition as THE bible for serious Apple users. Each purports to be a comprehensive guide to 65816 programming-usable by relative newcomers as well as experienced programmers. Thus you will find the obligatory tutorials on number systems, "how microprocessors work," and assembler mnemonics along with descriptions of 65816 operation and opcode-by-opcode definitions of machine instructions.

Indeed, with so many similarities, a surprise is that the books are really very different.

Dispelling the notion that technical material must be a dry cataloging of facts. Michael Fischer immediately sets out to involve the reader in the 65816's background and the excitement surrounding its introduction. Of the 600 pages of text (700, including data sheet reprints) a full third presents detailed descriptions of each instruction utilizing register diagrams, address mode charts, and illustrative mini-programs. Arranged in alphabetical order by mnemonic, the section is a very handy reference which, for users already wellversed in machine/assembly level programming, will supply practically all the 65816/65802 instruction information required.

The balance of the text is devoted to chapters developing example programs for code conversion, string handling, arithmetic, sorts and similarly basic tasks. While a few areas, notably data movement, actually experience overkill, discussion is on-target and listings are complete. The McGraw-Hill text is liberally sprinkled with diagrams and flowcharts and, owing chiefly to good organization, uncluttered format, and Fischer's conversational style, is easily the most readable of the three books.

With so many similarities, it is surprising that the books are really very different.

Completeness and a solid Apple bias make the Eyes-Lichty work a best bet to become the standard assembly language reference for users of the new Apple.

Whereas the 370-page Sybex offering exhibits the best "production values" (plenty of white space, good use of highlighting, effective diagrams, etc.), the slick veneer cannot hide a remarkable paucity of hard content. Merely masquerading as a 65816 pro-

gramming reference, the book is basically a Computer Science 101 text, even down to including chapter "exercises" (but no answers). William Labiak does hit upon some interesting topics (data structures and sorts, for instance), and lists a few example programs, but few areas receive anything like the treatment warranted.

As one might expect of the one text to receive Western Design's blessing, the 600-plus page (small print) Prentice-Hall release offers exceptional coverage of 65816 instructions and operation, including the best treatment of 65802, 6502, and 65C02 compatibility issues. Instead of dealing with instructions per se in a single large section, David Eyes and Ron Lichty have chosen to present both a quick reference (one page per instruction) and a multi-chapter "Tutorial" spiced with copious illustrative program fragments and numerous small programs.

Since the authors have developed their examples on 65816/65802-equipped Apples, the programs access standard Apple "hooks" for I/O. Aside from being runnable as-entered (a solid asset for beginners), the programs tend to do more interesting, more useful things. The piece de resistance is "DEBUG16," a 65816 machine code editor/disassembler complete with trace capabilities.

No one text does everything best. As a comprehensive quick reference, Fischer's book is unbeatable; but Eyes and Lichty supply more detail and their treatment of 65816 architecture and signals thoroughly eclipses the competition. Even Labiak's book might serve as a course text assuming the support of a knowledgeable instructor. While parts of Fischer's book will, no doubt, soon acquire dog-ears with heavy use, my favorite is the Eyes-Lichty work. Completeness and a solid Apple bias make it a best bet to become the standard assembly language reference for users of the new Apple.

Jeff Hurlburt is an Apple programmer and graduate student at the University of Houston, with special interest in education for gifted and talented children.

#### **REVIEWS**

#### 65816 Co-processor Boards

by MICHAEL FISCHER

Apple16 65816 Co-Processor Board Com Log Corporation 11056 N. 23rd Drive, #104 Phoenix, AZ 85029 (602) 248-0769 Apple II, II + or IIe \$395 without additional memory (IRCLE 220 ON READER SERVICE CARD

MultiRAM EX65816 Co-Processor Card Checkmate Technology, Inc. 509 S. Rockford Drive Tempe, AZ 85281 (602) 966-5802. Apple IIe; MultiRAM IIe card optional but desirable

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\$189; \$159.95 with 64K

Contrary to popular opinion, the Apple IIGS is not the first Apple computer that runs on a 65816 chip. I've been running my Apple IIe on one for over a year.

But using a 65816 chip in your Apple IIe is not just a simple matter of placing the new chip in your machine. You need either the **Apple16 Board**, the **MultiRAM EX** or a similar product that permits using the 65816 in your Apple IIe.

The two cards give your Apple IIe the power of the 65816, but they do not turn it into a Apple IIGS. As explained in other articles in this issue of *II Computing*, the Apple IIGS contains 128K of ROM and several custom chips and connectors not found on the Apple IIe. And these parts of the IIGS, as well as the 65816 processor, provide the full power of that machine.

But for Apple IIe owners who do not want to pay for a full upgrade to a IIGS, the Apple16 and MultiRAM EX provide the ability to tap the power of the 65816 microprocessor.

The Apple16 board is the simplest way to put a 65816 in your Apple IIe. The board fits into any slot except the auxiliary slot. It has up to 256K of linearly addressable memory included on it.

The Apple16 is not used the way a standard peripheral card is used—you don't issue a PR#<slot> command to turn it on. Instead the card is active whenever you turn on the machine. It functions in place of the 6502/65C02 on your Apple IIe motherboard.

The MultiRAM EX card is similar to the Apple16 in concept but not in installation. To install this card you

The 65816 boards will not let you upgrade your Apple to IIGs quality. But if you want just the power of the 65816 microprocessor without the full IIGs operating system and toolbox, one of the cards here may be just the way to go.

have to remove two chips from your Apple IIe, the 6502/65C02 processor and the MMU (memory management unit) chip; these chips are located in sockets on the Apple IIe.

(Before buying a MultiRAM EX card, you should open the lid of your IIe and be sure that the MMU, as well as the 6502/65C02, is inserted into a socket on the motherboard.)

After removing the two chips, you place the MMU into the socket on the MultiRAM EX card and then place the card into the two empty sockets you created on the motherboard. Now whenever you turn on your IIe, the 65816 chip takes over.

The EX card can be attached, by a cable supplied by Checkmate Technology, to the **MultiRAM He** card, also made by Checkmate Technology. This is an extended 80-column card which fits into the auxiliary slot on a He and can hold from 64K to 4 megabytes of RAM. The 65816 on the EX

card can address whatever memory is on the MultiRAM card.

Neither of these cards comes with any software. Existing Apple IIe software will work on your modified IIe. You won't see any change. Software written for the IIGS will not work on the IIe with a 65816 chip. To use the power of the 65816 you will have to write your own software using 65816 assembly language.

There are several other ways to get 65816 capability for your Apple IIe or IIc. I have not personally tested them.

You can replace the 6502/65C02 chip with a 65802 chip. This chip is similar to the 65816, but, like the 6502/65C02, it does not allow addressing more than 64K of memory without bank switching. A 65802 chip is available for \$50 from S-C Software Corporation, 2331 Gus Thomasson, Suite 125, P.O. Box 280300, Dallas, TX 75228, (214) 324-2050.

Checkmate also makes a card that Apple IIc owners can use. This card, similar to the MultiRam IIe and the EX, consists of 256K or 512K of memory and an optional 65816 chip. The board costs \$199.95 with 256K and \$119.95 for the 65816 upgrade. Installation calls for disassembling the case on the IIc, not a difficult task but definitely a time consuming one.

The Apple IIe or IIc owner who wants to upgrade his or her computer has many choices. If you want the full power of the IIGS, you must get the IIGS upgrade for the IIe. But if you want just the power of the 65816 microprocessor, without the full IIGS operating system and toolbox, one of the cards here may be just the way to go.//

Michael Fischer is the author of 65816/65802 Assembly Language Programming and a forthcoming book on the Apple IIGS both from Osborne/McGraw-Hill. He is co-author of the Apple II Expansion Guide from Tab Books.

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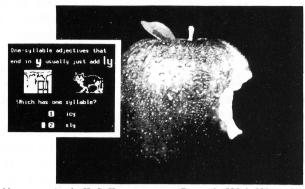
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PANDA INC.

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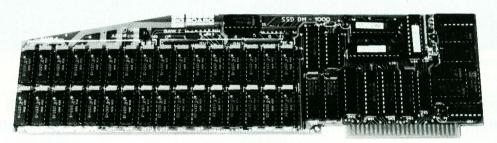
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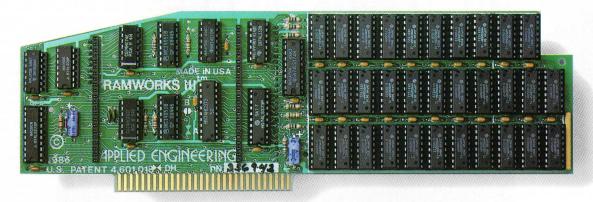
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#### The AppleWorks Amplifier.

While RamWorks III is recognized by all memory intensive programs, NO other expansion card comes close to offering the multitude of enhancements to AppleWorks that RamWorks III does. Naturally, you'd expect RamWorks III to expand the available desktop, after all Applied Engineering was a year ahead of everyone else including Apple in offering more than 55K, and we still provide the largest AppleWorks desktops available. But a larger desktop is just part of the story. Look at all the AppleWorks enhancements that even Apple's own card does not provide and only RamWorks III does. With a 256K or larger RamWorks III, all of AppleWorks (including printer routines) will automatically load itself into RAM dramatically increasing speed by eliminating the time required to access the program disk drive. Switch from word processing to spreadsheet to database at the speed of light with no wear on disk drives.

Only RamWorks eliminates Apple-Works' internal memory limits, increasing the maximum number of records available from 1.350 to over 25.000. Only RamWorks increases the number of lines permitted in the word processing mode from 2,250 to over 15,000. And only RamWorks offers a built-in printer buffer, so you won't have to wait for your printer to stop before returning to Apple-Works. RamWorks even expands the clipboard. And auto segments large files so they can be saved on two or more disks. You can even have Pinpoint or MacroWorks and your favorite spelling checker in RAM for instant response.

RamWorks, <u>nothing</u> comes close to enhancing AppleWorks so much.

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Using RamWorks III couldn't be easier because it's compatible with more offthe-shelf software than any other RAM card. Popular programs like AppleWorks, Pinpoint, Catalyst, MouseDesk, Howard-Soft, FlashCalc, Pro-Filer, Managing Your Money, SuperCalc 3a, and MagiCalc to name a few (and all hardware add on's like ProFile and Sider hard disks). Ram-Works is even compatible with software written for Apple cards. But unlike other cards, RamWorks plugs into the IIe auxiliary slot providing our super sharp 80 column text (U.S. Patent #4601081) in a completely integrated system while leaving expansion slots 1 through 7 available for other peripheral cards.

RamWorks III is compatible with all

Apple IIe's, enhanced, unenhanced, American or European versions.

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If you've got some other RAM card that's not being recognized by your programs, and you want RamWorks III, you're in luck. Because all you have to do is plug the memory chips from your current card into the expansion sockets on RamWorks to recapture most of your investment!

#### The Ultimate in RGB Color.

RGB color is an option on RamWorks and with good reason. Some others combine RGB color output with their memory cards, but that's unfair for those who don't need RGB *and* for those that do. Because if you don't need RGB

Applied Engineering doesn't make you buy it, but if you want RGB output you're in for a nice surprise because the RamWorks RGB option offers better color graphics plus a more readable 80 column text (that blows away any composite color monitor). For only \$129 it can be added to RamWorks giving you a razor sharp, vivid brilliance that most claim is the best they have ever seen. You'll also appreciate the multiple text colors (others only have green) that come standard. But the RamWorks RGB option is more than just the ultimate in color output because unlike others, it's fully compatible with all the Apple standards for RGB output control, making it more compatible with off-the-shelf software. With its FCC certified design, vou can use almost any RGB monitor because only the new RamWorks RGB option provides both Apple standard and IBM standard RGB outputs (cables included). The RGB option plugs into the back of RamWorks with no slot 1 inter-

#### Endorsed by the Experts.

A+ magazine said "Applied Engineering's RamWorks is a boon to those who must use large files with AppleWorks...I like the product so much that I am buying one for my own system." inCider magazine said "RamWorks is the most



"I wanted a memory card for my Apple that was fast, easy to use, and very compatible; so I bought RamWorks."

Steve Wozniak, the creator of Apple Computer

powerful auxiliary slot memory card available for your IIe, and I rate it four stars...For my money, Applied Engineering's RamWorks is king of the hill."

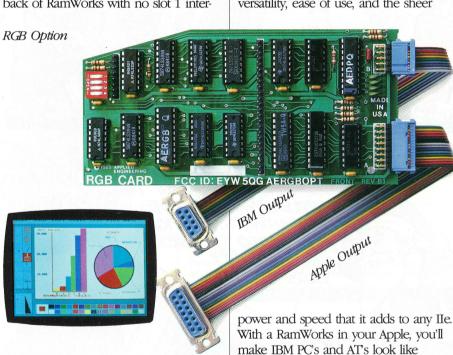
Apple experts everywhere are impressed by RamWorks's expandability, versatility, ease of use, and the sheer

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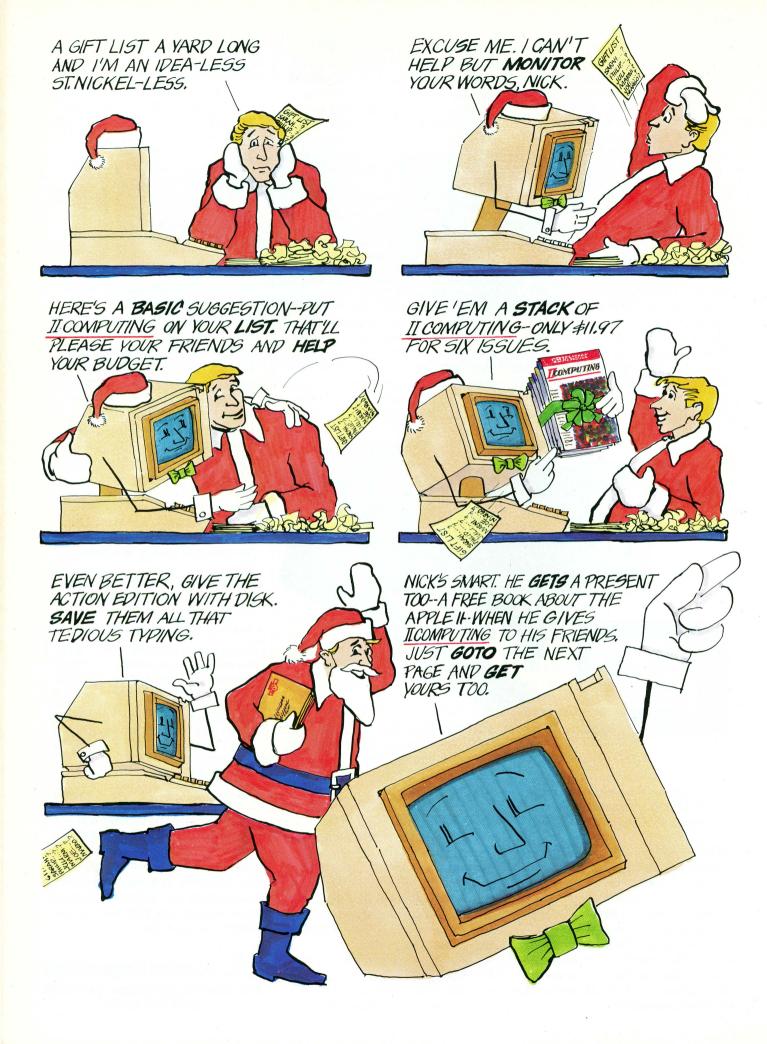
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# SOFTWARE LIBRARY

**II Computing**'s type-in listing section includes every full-length program from this issue. Since they're included all together, it's easy to remove and save them in a binder if you wish. All programs work with both DOS 3.3 and ProDOS unless otherwise noted.

CAUZIN SOFTSTRIP40
-Type Your Program Once! TYPO II MAKER
—A Classic Benchmark ERATOSTHENES' SIEVE
—If It's Tuesday This Must Be  CALENDAR MAKER
—Sharpen Your Math Skills FLASH MATH
—Easy Object Code Loader HEX ENTRY
-Game Frame TYPERIGHT
-Advanced Computer Concepts THINKING ABOUT THINKING
—Decoding Pictures From CompuServe GETTING THE PICTURE

**NOTE:** If you have the Action Disk version of **II Computing**, you can use all these programs immediately. Just boot the disk and, when the menu appears, move the inverse bar to highlight the program title and press RETURN. To restart the menu, quit the program and type RUN STARTUP.

The Action Disk also contains a program for converting to DOS 3.3. Boot the Action Disk and, at the menu, press ESC. At the ] prompt type BRUN CONVERT, then follow the screen instructions. Your destination disk must already be formatted for DOS 3.3. To set direction of transfer, press R; to start the conversion, press T.

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OCTOBER / NOVEMBER 1986

## Softstrip From Cauzin Systems

These Cauzin Softstrips contain programs from this issue's Software Library. You can read each Softstrip directly into your Apple II, II+, IIe or IIc with a Cauzin Softstrip Reader, available from many computer stores for \$199. The Softstrip Reader can also read the strips in books and other magazines.

If you don't own a Softstrip reader, call Cauzin Systems at 1-800-533-7323 (in Connecticut, (203) 573-0150) for the address of the nearest store with an Apple and a Softstrip Reader. Then bring this issue of *Il Computing* and a formatted DOS 3.3 or ProDOS disk to the store for a demonstration. The dealer will transfer the files from Softstrip to disk free of charge, and you'll see how easy getting software out of a magazine can be.//

This Softstrip contains Bill Marquardt's TYPERIGHT (page 55) and Michael Biancalana's FLASH.MATH (page 68.)//

## TYPO II (TYPE YOUR PROGRAM ONCE)

TYPO.II is the automatic proofreading program for *II Computing*'s Software Library. It generates a two-letter code for each line in a BASIC program. It also produces a total checksum for the entire program. When you use TYPO.II, it should give you the same letter codes and checksum that appear in the Typo II Table for that program. If it doesn't, you've mistyped a line.

To use TYPO.II, type in the program on this page and then SAVE it as TYPO.II.MAKER. Then type RUN TYPO.II.MAKER. This creates a text file called TYPO.II, which is the actual proofreading program.

Now, for each BASIC program you want to use from the Software Library:

1. Type in the BASIC program. Be sure to include all REM and DATA statements, and all spaces within quotes. When the program is complete, SAVE it on disk.

Then LIST the program to make sure it's still in memory. 2. Type EXEC TYPO.II and press RETURN. A list of two-letter codes and the total checksum will be printed on the screen. (You can send this information to your printer by typing PR#1 before you type EXEC TYPO.II.) Compare the codes and checksum to those printed in the program's Typo II Table, listed with it in the Software Library.

3. If a two-letter code does not match the code in the Typo II Table, correct the BASIC program line. If the total checksum does not match, make sure that every line is in the program. Then type EXEC TYPO.II and check the codes and checksum again. Repeat the process until all the codes and the checksum match.

Then SAVE the corrected type-in program to disk. It's now free of typing errors and ready to run!//

```
10 DS - CHRS (4)
20 PRINT DS; "OPEN TYPO.II": PRINT
    DS: "WRITE TYPO.II"
   LIST 63000,63150
    PRINT "RUN 63040": PRINT D$;
    "CLOSE"
50
    NEW
63000
      REM * TYPO II, VERSION 1.
63010
      REM * BY GERRY VILLAREAL
    AND FRANK HAYES
63020 REM * (C) 1985, 1986 ANTI
    C PUBLISHING INC.
63030
      REM * II COMPUTING
63040 TEXT : HOME : PRINT SPC
    11); "CODE", SPC( 5) "LINE NO.
    ": POKE 34,1
63042 DEF FN PK(X) = PEEK(X) + 256 * PEEK(X + 1)
63050 CH = 0:S = FN PK(103)
```

```
63060 \text{ S1} = \text{S} + 3:\text{N} = \text{FN PK(S):L}
    INE = FN PK(S + 2): IF LINE
     - 63000 THEN 63140
63070 LV = 0: FOR A = 1 TO 255
63080 C = PEEK (S1 + A): IF C =
    0 THEN 63100
63090 LU = LU + C * A: NEXT A
63100 CODE = LV -
                   INT (LU / 676
    ) * 676
63110 HCODE -
               INT (CODE / 26):L
    CODE = CODE - HCODE * 26
63120 PRINT SPC( 12); CHR$ (HC
    ODE + 65); CHR$ (LCODE + 65)
    ; SPC( B); LINE
63130 CH = CH + LU + LINE:S = N:
     GOTO 63060
63140 PRINT SPC( 7); "TOTAL CHE
    CKSUM = "; CH: POKE 34,0
63150 DEL 63000,63150
```

## NO MORE TYPING!!

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## **ERATOSTHENES' SIEVE**

Article on page 10

```
10
    REM * ERATOSTHENES' SIEVE
20
    REM * BY FRANK HAYES
    REM * (C) 1986 ANTIC PUBLISH
    ING, INC.
40
    REM * II COMPUTING VOL.2 NO.
52 TRUE - 0
54 FALSE = 255
56 SIZE = 8190
60 FLAGS = 8192
100 PRINT "10 ITERATIONS"
     FOR ITER = 1 TO 10
130 COUNT - 0
     HGR : POKE - 16302,0
140
150
    FOR I - 0 TO SIZE
152 IF PEEK (FLAGS + I) = FALS
    E THEN 170
154 PRIME = I + I + 3
     FOR K = I + PRIME TO SIZE
     POKE FLAGS + K, FALSE
158
159 K = K + PRIME - 1
160 NEXT K
162 COUNT = COUNT + 1
170 NEXT I
172
    NEXT ITER
```

180	PRINT	COUNT;	"	PRIMES.	33
198	TEXT				
199	PRINT	CHR\$	(7	)	

## TYPO II TABLE

Code	Line#	Code	Line#	Code	Line#	-
KD	10	UR	120	xx	159	
UP	20	DO	130	KU	160	
TH	30	LG	140	KT	162	
GO	40	NM	150	KQ	170	
DB	52	GZ	152	US	172	
IQ	54	JX	154	PO	180	
AC	56	DJ	156	FH	198	
EB	60	MK	158	TX	199	
YP	100					

Total checksum = 208738

## CALENDAR MAKER

Article on page 61

## CALENDAR.MAKER

- REM \* CALENDAR MAKER REM \* BY DUDLEY GLASS, III 20 REM \* (C) 1986 ANTIC PUBLISH 70 ING, INC. REM \* II COMPUTING VOL.2 NO 50 REM \* PROGRAM CONTROL 60 GOSUB 900: REM INITIALIZE REM \* CHOOSE BETWEEN MONTH A ND YEAR TEXT : HOME POKE 1403, 20: UTAB 5: PRINT "II COMPUTING CALENDAR GENER ATOR" 73 POKE 1403,20: VTAB 9: PRINT "<1> PRINT A WHOLE CALENDAR" POKE 1403,20: VTAB 11: PRINT "<2> PRINT A SINGLE MONTH" POKE 1403, 20: UTAB 13: PRINT "SELECT ONE: "; 76 GET SELS: ON VAL (SELS) = 2 GOTO 3000
- VAL (SEL\$) < > 1 GOTO 7 ON GOSUB 200: GOSUB 120: GOTO 140 REM GET DECISIONS REM \* TEST FOR LEAP YR; ADJ UST LD(2) AS REQUIRED INT (YR / 4) < 4 THEN RETURN INT (YR / 100) < > YR / IF 100 THEN LD(2) = 29: RETURN IF INT (YR / 400) < > YR / 400 THEN LD(2) = 28 133 RETURN REM \* USE ZELLER TO GENERAT E MONTHS' CALENDARS 140 HOME FOR MO = 1 TO 12143 145 DY = 1 GOSUB 500: REM \* FIND DAY O F WEEK FOR FIRST DAY OF MONT 155 ON SELECT GOSUB 300, 400: REM

\* PRINT MONTH TO LINES ARRAY OR SCREEN

160 NEXT

165 ON SELECT GOSUB 600,700: REM \* COMPLETE PRINTING TO PAGE OR SCREEN

170 IF SELECT = 2 THEN Q = PEEK (49168): IF Q < 128 THEN 170 : REM \* HOLD SCREEN IMAGE UN TIL KEY PRESS

175 GOSUB 800: REM \* GET FURTHE R USER DECISIONS

180 IF CHOICE - 1 THEN GOSUB 9 50: GOTO 110

185 HOME : END

200 REM \* INITIAL DECISIONS

205 HOME

210 POKE 1403,20: UTAB 5: PRINT "II COMPUTING CALENDAR GENER ATOR"

215 POKE 1403,20: UTAB 7: PRINT "ENTER:"

220 POKE 1403,20: UTAB 8: INPUT "OUTPUT TO SCREEN (S) OR PRI NTER (P)? "; SEL\$

225 SELECT = 1: IF SEL\$ = "S" OR SEL\$ = "s" THEN SELECT = 2

230 IF (PR\$ = "" AND SELECT = 1
) THEN POKE 1403,20: UTAB 9
: INPUT "PRINTER SLOT: ";PR\$
: IF VAL (PR\$) < 1 OR VAL
(PR\$) > 7 THEN PR\$ = "": GOTO
205

235 POKE 1403,20: VTAB 11: INPUT "YEAR TO GENERATE? "; YR\$:YR = VAL (YR\$): IF YR < 100 THEN YR = YR + 1900

240 IF YR < 1752 THEN UTAB 20:
PRINT "SELECTED YEAR IS PRI
OR TO ADOPTION OF GREGORIAN
CALENDAR IN ENGLAND.": FOR X
= 1 TO 1000: NEXT

250 RETURN

300 REM \* CALENDAR PRINTER LINE ASSEMBLY SUBROUTINE

305 LP = 7 - SD:EP = 21:JF = 0

310 LD = LD(MO):CV = CV(MO):CH = CH(MO)

315 LINE\$(CU) = LEFT\$ (LINE\$(CU),CH - 1) + MID\$ (DAYS\$,(LP \* 3) - 2,EP)

320 LINES(CU) = LINES(CU) + LEFTS
(SPACES,79 - LEN (LINES(CU)

325 IF LP + 14 < = LD + 6 THEN LP = LP + 7:CV = CV + 1: GOTO 315

330 IF JF = 1 THEN GOTO 340

335 LP = LP + 7:CV = CV + 1:JF = 1:EP = 3 \* (LD + 7 - LP): GOTO 315

340 RETURN

400 REM \* CALENDAR SCREEN PRINT SUBROUTINE

405 LP = 7 - SD:EP = 21:JF = 0 410 LD = LD(MO):CV = CV(MO):CH = CH(MO)

415 POKE 36, CH: UTAB CU: PRINT

MID\$ (DAYS\$,(LP \* 3) - 2,EP);

420 IF LP + 14 < = LD + 6 THEN LP = LP + 7:CV = CV + 1: GOTO 415

425 IF JF = 1 THEN GOTO 435

430 LP = LP + 7:CU = CU + 1:JF = 1:EP = 3 \* (LD + 7 - LP): GOTO 415

435 RETURN

500 REM \* ZELLER'S CONGRUENCE: FIND FIRST DAY OF MONTH

505 MA = MOS + 10: YA = YR - 1

510 IF MO > 2 THEN MA = MA - 12 :YA = YA + 1

515 CN = INT (YA / 100):CY = YA - 100 \* CN

520 SD = INT ((13 \* MA - 1) / 5 ) + DY + CY + INT (CY / 4) + INT (CN / 4) + (5 \* CN)

525 SD = FN MD7(SD)

530 RETURN

600 REM \* PRINTER OUTPUT SUBROU TINE

605 LINE\$(0) = S\$ + LABEL\$ + S\$ + LABEL\$ + S\$ + LABEL\$

610 PRINT CHR\$ (4); "PR#"; PR\$

615 PRINT : PRINT LEFT\$ (SPACE \$,38);YR

620 FOR Y = 0 TO 9 STEP 3

625 Z = (Y \* 2) + 1

630 PRINT: PRINT " "; MO\$(Y + 1); LEFT\$ (SPACE\$,22); MO\$(Y + 2); LEFT\$ (SPACE\$,22); MO\$(Y + 3)

635 PRINT LINE\$(0)

640 FOR X = Z TO Z + 5: PRINT L INE\$(X): NEXT : PRINT

645 NEXT

646 PRINT CHR\$ (12)

650 PRINT CHR\$ (4); "PR#3"

655 RETURN

700 REM \* ADD LABELS TO SCREEN IMAGE SUBROUTINE

705 INVERSE

710 FOR MO = 1 TO 12

715 FOR X = 1 TO 3

720 POKE 36,CH(MO) - 1: UTAB CV

725 PRINT MID\$ (MO\$(MO), X, 1);

730 NEXT : NEXT

735 YR\$ = STR\$ (YR): FOR X = 1 TO 4: POKE 36,1: VTAB 10 + X: PRINT MID\$ (YR\$,X,1);: NEXT

740 NORMAL

745 RETURN

800 REM \* AGAIN OR QUIT

805 HOME : POKE 49168,0

810 POKE 1403,20: VTAB 8: PRINT "TASK COMPLETED: ANOTHER CA LENDAR? (Y/N) ";: GET CH\$

815 CHOICE = 0: IF CH\$ = "y" OR CH\$ = "Y" THEN CHOICE = 1

820 RETURN

900 REM \* INITIALIZATION SUBROU TINES

901 PRINT CHR\$ (4); "PR#3": PRINT

902 FOR I = 1 TO 18:DAYS\$ = DAY
S\$ + CHR\$ (32): NEXT I 903 FOR I = 1 TO 9:DAYS\$ = DAYS
\$ + CHR\$ (32) + CHR\$ (32) +
STR\$ (I): NEXT I 904 FOR I = 10 TO 31:DAYS\$ = DA
YS\$ + CHR\$ (32) + STR\$ (I) : NEXT I
905 FOR I = 1 TO 4:S\$ = S\$ + CHR\$
(32): NEXT 910 LABELS = "SU MO TU WE TH FR
SA " 915 DIM MO\$(12),LD(12),CH(12),C V(12),LINE\$(24)
920 FOR X = 1 TO 12: READ MOS(X
):MO\$ = CHR\$ (32) + MO\$: NEXT
925 FOR X = 1 TO 12: READ LD(X) : NEXT
930 FOR X = 1 TO 12: READ CH(X) : NEXT
935 FOR X = 1 TO 12: READ CV(X) : NEXT
940 FOR X = 1 TO 79:SPACE\$ = SP
ACES + CHRS (32): NEXT 945 DEF FN MD7(X) = X - 7 * INT
(X / 7) 950 FOR X = 1 TO 24:LINE\$(X) =
SPACES: NEXT 955 RETURN
1000 DATA JAN, FEB, MAR, APR, MAY,
JUN, JUL, AUG, SEP, OCT, NOV, DEC 1010 DATA 31, 28, 31, 30, 31, 30, 31
,31,30,31,30,31 1020 DATA 4,29,54,4,29,54,4,29
,54,4,29,54 1030 DATA 1,1,1,7,7,7,13,13,13
,19,19,19
3000 REM * PRINT A MONTH 3010 GOSUB 200
3015 POKE 1403,20: VTAB 13: INPUT "MONTH TO GENERATE? ";MO\$:MO
- VAL (MO\$): IF MO < 1 DR MO > 12 THEN 3015
3018 GOSUB 120
3020 DY = 1: HOME 3030 GOSUB 500: REM * FIND DAY
OF WEEK FOR FIRST DAY OF MON
3040 ON SELECT GOSUB 5000,4000 3060 IF SELECT = 2 THEN Q = PEEK
(49168): IF Q < 128 THEN 170
: REM * HOLD SCREEN IMAGE UN TIL KEY PRESS
3070 GOTO 175: REM * GET FURTHE R USER DECISIONS
4000 REM * SCREEN PRINT A MONT
4005 HOME : POKE 1403,36: PRINT MO\$(MO);" "YR: PRINT
4006 I = 1:T = I 4007 POKE 1403,T * 10: PRINT MIDS
(LABELS, I, 3);
4008 IF T < 7 THEN I = I + 3:T = T + 1: GOTO 4007
4009 PRINT 4010 SD = SD + 1:H = SD:D = 1:V =
4:X = 4: UTAB U 4020 POKE 1403,H * 10: PRINT D;
The remainder the restaurant

4030 H = H + 1: IF H > 7 THEN H =
1:U = U + X: UTAB U
4040 D = D + 1: IF D < = LD(MO)
THEN 4020
4050 RETURN
5000 REM * PRINT A MONTH
5001 SL = VAL (PR\$)
5003 PRINT CHR\$ (4); "PR#"SL
5004 PRINT
5005 PRINT TAB( 36); MO\$(MO); "
"YR
5010 SD = SD + 1:H = SD:D = 1:V =
4: FOR X = 1 TO 8: PRINT : NEXT
5014 I = 1:T = I
5015 PRINT TAB( T * 10); MIDS
(LABEL\$, I, 3);
5016 IF T < 7 THEN I = I + 3:T =
T + 1: GOTO 5015
5017 PRINT : PRINT : PRINT
5020 PRINT TAB( H * 10);D;
5030 H = H + 1: IF H > 7 THEN H =
1: FOR X = 1 TO 8: PRINT : NEXT
5040 D = D + 1: IF D < = LD(MO)
THEN 5020
5045 PRINT : PRINT CHR\$ (12)
5050 PRINT CHR\$ (4); "PR#3": RETURN
JUST TRIVIL CHRA (1), TRUS TRETORY

## TYPO II TABLE

Code	Line#	Code	Line#	Code	Line#
CO RETINENDE CARDON DIN DIN DIN DIN DIN DIN DIN DIN DIN DI	Line#  10 20 30 40 50 60 71 72 73 74 75 76 77 110 115 120 133 135 140 143 145 155 166 170	COD GANGON XEIVX GFAROVKS FAROVKS FAREYV	Line# 340050412230505050505050505050505050505050505050	CO LYFST XXEJJV GM N N N N O S L I A H XXF C E E	Line# 910 915 925 9350 9350 9450 955 1000 10230 9010 10230 3015 3018 30230 40005 40005 40009
HE FO	175 1 <b>80</b>	SQ	700 705	QN ZJ	4010 4020

ZB	185	EO	710	WN	4030	IW	300		UW	815	GA	5016
NQ	200	OE	715	SE	4040	NZ	305		GV	820	ZU	5017
FU	205	TI	720	GV	4050	QO	310		SL	900	BG	5020
CU	210	YH	725	PN	5000	PE	315		PC	901	UU	5030
OS	215	YM	730	LU	5001	BU	320		XT	902	SW	5040
YI	250	SU	735	RJ	5003	LS	325		QF	903	JS	5045
ND	225	GB	740	HE	5004	XH	330		OB	904	KG	5050
EU	230	GV	745	SX	5005	WW	335		EX	905		
DF	235	DC	800	AC	5010							
EK	240	XJ	805	NF	5014	Tota	l che	cksu	m =	5686320		
GV	250	WB	810	QU	5015							

## FRIDAYS.CHILD

10	REM * FRIDAY'S CHILD
20	REM * BY DUDLEY GLASS
30	REM * (C) 1986 ANTIC PUBLISH
	ING, INC.
40	REM * II COMPUTING VOL.2 NO.
	1 - V 1 G PORTOR RESERVE RESERVE RESERVE
50	HOME
60	FOR X = 0 TO 6
70	READ DNAMES(X)
80	NEXT
90	DEF FN MD7(X) = $X - 7 * INT$
	(X / 7)
100	INPUT "PLEASE ENTER YOUR BI
	RTHDATE: MONTH: "; MOS
120	HTAB 32: INPUT "DAY: "; DYS
130	HTAB 31: INPUT "YEAR: ";YR\$
100	ATTO ST. INTOT TENK. , IND
140	DY = VAL (DYS):MO = VAL (M
	0\$)
150	YR = VAL (YR\$): IF LEN (YR
	\$) < 4 THEN YR = YR + 1900
200	GOSUB 500
	PRINT : PRINT "YOUR DAY OF
	BIRTH WAS A ": DNAME\$(SD)
220	END
	REM ZELLER'S CONGRUENCE
	MA = MO + 10:YA = YR - 1
	IF MO > 2 THEN MA = MA - 12
250	:YA = YA + 1
E30	에 이 그림 하게 되었다. 그림을 하였다고 있는데 회사를 하는데 보고 있다면 하는데 되었다면 하는데 되었다면 하는데 없는데 없는데 하는데 하는데 하는데 하는데 하는데 하는데 하는데 하는데 하는데 하
שנכ	CN = INT (YA / 100):CY = YA

540	SD =									
	) + 0								4)	+
	INT	(CN	1 4	) +	(	5 3	* CI	CN		
550	SD =	FN	MD7	(SI	1)		le iu			
560	RETU	RN								
1000	DAT	A	SUN	DAY	,	MON	ADA	Υ,	TU	E
	SDAY,	WEI	DNES	DAY	,	THU	JRS	DAY	,	F
	RIDAY	. Sf	TUR	DAY						

## TYPO II TABLE

Code	Line#	Code	Line#	Code	Line#
GU	10	WQ	100	MS	500
XT	20	FX	120	ZS	510
TH	30	GE	130	BF	520
GO	40	MZ	140	FA	530
FU	50	HY	150	VR	540
OS	60	XU	200	KD	550
YK	70	CS	210	GV	560
FA	80	EY	220	EI	1000
AJ	90				

Total checksum = 664722

## FLASH MATH

Article on page 68

- REM \* FLASH MATH 10 REM \* BY MICHAEL J. BIANCALA REM \* (C) 1986 ANTIC PUBLISH ING, INC. 30 REM \* II COMPUTING VOL. 2 NO 40 99 REM \* INITIALIZE
- 100 PRINT CHR\$ (27) + CHR\$ (1 7) 110 HOME : INVERSE : PRINT "PLE ASE WAIT ... ": NORMAL 120 DS = CHR\$ (4) 130 KEY = - 16384:CLR = - 1636 140 FILES = "BLOCK"

continued on next page

```
150 GP = - 16304:TX = GP + 1:FS
      = TX + 1:SS = FS + 1
      PRINT DS: "BLOAD "FILES". AS6
     aaa"
 170
      POKE 232,0: POKE 233,96
     SCALE= 1: ROT= 0:HT = 0:UT =
 180
     0:S = 0
     VIAB 5: PRINT "<1> MONOCHRO
200
     ME MONITOR"
      UTAB 7: PRINT "<2> COLOR MO
     NITOR"
 220
     GET MS:M = VAL (MS)
 230 BK = 6:HC = 7: IF M = 1 THEN
     BK = 7:HC = 4
     FOR I = 1 TO 4: READ F$(I):
 240
      NEXT : OPS = "+-*/"
      DATA ADDITION, SUBTRACTION, M
     ULTIPLICATION. DIVISION
 499
     REM * MAIN MENU
500 HGR : POKE FS, 0: HCOLOR= BK
     : HPLOT 0,0: CALL - 3082: HCOLOR=
HC
510 A$ = "FLASH MATH": UT = 2: HT =
     3: GOSUB 9000
 520 A$ = "1. + ADD +": VT = 30: GOSUB
     9000
 530 A$ = "2. - SUBTRACT -": VT =
     55: GOSUB 9000
 540 A$ = "3. * MULTIPLY *":VT =
     80: GOSUB 9000
 550 AS - "4. / DIVIDE /":VT - 10
     5: GOSUB 9000
 560 A$ = "5. QUIT": VT = 130: GOSUB
     9000
 570 A$ = "SELECT ONE:": UT = 160:
     HT = 3: GOSUB 9000
 580 GET K$
590 F = VAL (K$)
600 IF F < 1 OR F > 5 THEN 580
610 IF 'F = 5 GOTO 5000
999 REM * MAIN LOOP
      GOSUB 8000: GOSUB 8100: GOSUB
     8200
 1010 FOR J = 1 TO 10 STEP MODE
 1020 \text{ AS} = FS(F): VT = 5: HT = ((F =
     1) * 4) + ((F = 2) * 2.5) +
     ((F = 3) * .75) + ((F = 4) *
     4): GOSUB 9000
      IF MODE THEN AS = "NO." +
      STR$ (J):VT = 25:HT = .5: GOSUB
     9000
1040 GOSUB 8500
 1050 \text{ N3} = ((\text{N1} + \text{N2}) * (\text{F} = 1)) +
     ((N1 - N2) * (F = 2)) + ((N1
      * N2) * (F = 3)) + ((N1 / N)
     2) * (F = 4))
 1060 A$ = STR$ (N1):UT = 60:HT =
     9 - LEN (A$): GOSUB 9000
 1070 \text{ AS} = \text{MIDS} (OPS, F, 1) + STRS
     (N2):VT = 85:HT = 9 - LEN (
     A$): GOSUB 9000
 1080 AS = "
              ___": UT = 105: HT = 9
      - LEN (A$): GOSUB 9000
 1090 A$ = ""
      GOSUB 8600: NEXT J
 1110 IF MODE THEN GOSUB 6000
 1120 GOSUB 8300: GOSUB 8240
 1130
      GOTO 1010
 5000 REM * QUIT
```

```
5010 TEXT : HOME : PRINT "JBYE.
    ..": END
5999 REM * CHECK SCORE
6000 HCOLOR- BK: HPLOT 0.0: CALL
     - 3082: HCOLOR= HC
6010 A$ = "SCORE": UT = 10: HT = 5
   : GOSUB 9000
6020 AS - STRS (S * 10) + CHRS
    (32) + "PERCENT": UT = 110: HT
     - 2.5: GOSUB 9000
6030 IF S < 7 THEN AS = "BETTER
    STUDY"
6040 IF S > 6 THEN AS = "NOT TO
   O BAD"
     IF S > B THEN AS = " VERY
6050
   GOOD"
6060 IF S = 10 THEN AS = "
                              GR
   FAT"
6070 S = 0
6080 VT = 50:HT = 2: GOSUB 9000
6090 AS - "ANY KEY CONTINUES": UT
    = 160:HT = - .75: GOSUB 90
   00: GET K$
6100 RETURN
7999 REM * SET UP
8000 POKE TX,0: HOME
8010 UTAB 1: HTAB 3: INVERSE : PRINT
    "SETTING UP "; F$(F): NORMAL
8020 UTAB 5: PRINT "SPECIFY THE
    RANGE OF TWO NUMBERS"
     UTAB 10: INPUT "LOWEST VAL
   UE OF THE TOP NUMBER? ": X$:L
    T = VAL(X$)
8040 VTAB 12: INPUT "HIGHEST VA
   LUE OF THE TOP NUMBER? "; X$:
   TH = VAL(X$)
8050 UTAB 14: INPUT "LOWEST VAL
   UE OF THE BOTTOM NUMBER? ":X
    S:LB = VAL(XS)
8060 VTAB 16: INPUT "HIGHEST VA
   LUE OF THE BOTTOM NUMBER? ";
   XS: HB = VAL (XS): RETURN
8099 REM * SET TIMER
8100 TEXT : HOME : PRINT "IF YO
   U WANT TO SET THE TIMER"
8110 PRINT "CHOOSE A NUMBER BET
   WEEN 0-9": PRINT "(1=SLOW, 9
    =FAST, Ø=TIMER OFF)": GET K$
    :T = VAL (K$): RETURN
8199 REM * SET MODE
     TEXT : HOME : UTAB 10: HTAB
   10: PRINT "<1> FLASHCARDS"
8210 UTAB 12: HTAB 10: PRINT "<
   2> YOUR TURN"
     UTAB 14: HTAB 12: PRINT "S
   ELECT ONE: ":
8230 VTAB 14: HTAB 24: GET KS:M
   ODE = VAL (K$) - 1: IF MODE
     < 0 OR MODE > 1 THEN 8230
     IF MODE THEN HOME : PRINT
8240
    "NOW I'LL QUIZ YOU ON TEN PR
    OBLEMS": PRINT "SEE IF YOU C
    AN GET THEM ALL": PRINT : PRINT
    "ANY KEY TO CONTINUE": GET K
8250 HCOLOR- BK: HPLOT 0,0: CALL
     - 3082: HCOLOR= HC
```

8260 POKE GP, Ø: POKE FS, Ø IF NOT MODE THEN T = T + 8270 8280 RETURN 8299 REM \*SECONDARY OPTIONS POKE TXT, D: HOME 8300 UTAB 5: HTAB 15: PRINT "CH ANGE OPTIONS" 8320 UTAB 10: HTAB 12: PRINT "< 1> RESET RANGE" UTAB 12: HTAB 12: PRINT "< 2> RESET TIMER" UTAB 14: HTAB 12: PRINT "< 3> YOUR TURN" UTAB 16: HTAB 12: PRINT "< 8350 4> CHANGE FUNCTION" 8360 VTAB 18: HTAB 15: PRINT "S ELECT: ";: 8370 GET KS:X = VAL (K\$) IF X = 1 THEN GOSUB 8000 8380 IF X = 2 THEN GOSUB 8100 8390 8400 IF X < 3 AND X > 0 THEN 83 8410 IF X = 3 THEN MODE = 1: RETURN 8420 IF X = 4 THEN POP : GOTO 500 8430 GOTO 8370 8499 REM \* RANDOM NUMBER 8500 N1 = INT (TH \* RND (1)) + 1: IF N1 < LT THEN N1 = LT 8510 N2 = INT (HB \* RND (1)) + 1: IF N2 < LB THEN N2 = LB 8520 IF F = 2 AND N2 > N1 THEN 8500 8530 IF F = 4 AND N2 > N1 THEN 8500 8540 IF F = 4 THEN N1 = N1 \* N2 8550 RETURN REM \* INPUT ROUTINE 8599 POKE CLR, Ø 8600 8610 A1\$ = " " FOR LOOP = 0 TO 1500 STEP 8620 T 8630 K = PEEK (KEY): IF K < 128 THEN 8690 8640 POKE CLR, 0: IF NOT MODE AND K = 155 THEN J = 10: RETURN IF NOT MODE THEN FOR I -1 TO 15: NEXT : GOTO 8690 8660 IF K = 141 THEN POKE FS,0 : GOTO 8720 8670 IF K = 136 OR K = 255 AND LEN (A1\$) > 1 THEN A\$ = A1\$ :UT = 110:HT = 9 - LEN (A\$) : HCOLOR= BK: GOSUB 9000:A1\$ = LEFTS (A1S, ( LEN (A1S) -1)):A\$ = A1\$:VT = 110:HT = 9 - LEN (A\$): HCOLOR= HC: GOSUB 9000 8680 IF K > 175 AND K < 186 THEN A\$ = A1\$: UT = 110: HT = 9 - LEN (A\$): HCOLOR= BK: GOSUB 9000 :A1S = A1S + CHRS (K - 128):A\$ = A1\$:VT = 110:HT = 9 -LEN (A\$): HCOLOR= HC: GOSUB 9000

8690 NEXT LOOP 8700 IF T > Ø AND MODE THEN AS = "TIME'S UP": UT = 135: HT = 3: GOSUB 9000 8710 AS = A1S: UT = 110: AS = A1S: UT = 110:HT = 9 - LEN (AS): HCOLOR= BK: GOSUB 9000:A\$ = STR\$ (N3):VT = 110:HT = 9 -LEN (A\$): HCOLOR= HC: GOSUB 9000: GOTO 8740 8720 IF UAL (A1\$) < > N3 THEN A\$ = "WRONG": VT = 135: HT = 5 : GOSUB 9000 8730 IF VAL (A1\$) = N3 THEN S = S + 1:A\$ = "CORRECT": UT = 13 5:HT = 4: GOSUB 9000 8740 AS = "ANY KEY CONTINUES": UT = 160:HT = - .75: GOSUB 90 00: GET K\$ 8750 HCOLOR= BK: HPLOT 0,0: CALL - 3082: HCOLOR= HC: RETURN 8999 REM \* PRINT ROUTINE 9000 FOR I = 1 TO LEN (A\$) 9005 A = ASC (MID\$ (A\$, I, 1)) -31 9010 DRAW A AT (HT \* 16) + I \* 16, UT 9020 NEXT I 9030 HT - 0

## TYPO II TABLE

9040 Z - FRE (0)

9050 RETURN

Code	Line#	Code	Line#	Code	Line#
на	10	BC	1100	MK	8330
RK	20	CB	1110	DT	8340
TH	30	NF	1120	BY	8350
TG	40	GR	1130	MT	8360
AP	99	EB	5000	OF	8370
XC	100	MQ	5010	GF	8380
EH	110	UY	5999	GR	8390
RR	120	RS	6000	UT	8400
QU	130	IU	6010	SV	8410
OT	140	00	6050	LQ	8420
VQ	150	WU	6030	IM	8430
ZP	160	KX	6040	LA	8499
TA	170	ZN	6050	WX	8500
LA	180	QN	6060	LR	8510
KY	200	YT	6070	WZ	8520
ML	210	CJ	6080	XH	8530
MY	220	ZP	6090	FG	8540
NH	230	GU	6100	GV	8550
EM	240	RR	7999	BG	8599
UF	250	PU	8000	BF	8600
DG	499	YC	8010	NN	8610
EP	500	UP	8020	CI	8620
GS	510	WS	8030	NU	8630
YW	520	VB	8040	LP	8640
GO	530	LG	8050	NK	8650
QL	540	KO	8060	FB	8660
GF	550	MA	8099	YH	8670
	,			continued on	

continued on next page

JS	560	BY	8100	UM	8680	WP	1030		YC	8270		YN	9005
SX	570	OL	8110	UN	8690	HU	1040		GV	8280		XB	9010
RG	580	TC	8199	QN	8700	JO	1050		GX	8299		KQ	9020
HB	590	WG	8200	QL	8710	EA	1060		UL	8300		00	9030
TP	600	CN	8210	WS	8720	WI	1070		WN	8310		RA	9040
DC	610	WM	8220	TG	8730	PH	1080		TO	8320		GV	9050
EW	999	HK	8230	ZP	8740	PB	1090						
LR	1000	SG	8240	XH	8750								
WL	1010	RS	8250	QR	8999	Tota	1 chec	ksu	m =	593983	14		
ZN	1020	GN	8260	IQ	9000								
						1 8033							

## **BLOCK**

Enter using HEX.ENTRY

6100: 64 00 CC 00 CE 02 AO 03 D4 03 EC 03 EE 03 20 2E 04 04 6120: 05 05 6E 05 05 **C6** FA 05 23 06 53 E0 05 06 CO 06 06 1A 07 7A 80 DE 6140: EO 07 E4 18 08 93 08 BC 08 F7 08 10 09 60 09 DB 09 17 0A 32 0A 54 OA AF 0A **C7** 0A 05 OB CH: 2319 6160: 3F OB OB A3 0B 1A 00 7A 00 AF 00 (9 00 04 00 38 00 74 OD A6 00 68 00 F2 OD F4 UD F6 0D F8 0D CH: 2592 0E 59 0E 5D 0E 5F 0F 61 0F 63 0E 65 0E 67 0E 69 0E 6B 0E 6D 0E 61A0: 7D 0E 7F 83 0E 0E 0F 00 49 49 11 3F 3F 17 2D 15 18 6F CH- 2331 61F0: 29 4D 35 DF FF 18 2E 2D 2D 2D 2D 35 3F 3F 3F 3F 3F 2E 2D 2D 2D 2D 35 3F 1F 1F 3F 2E CH: 1995 6200: 4D 29 2D 37 37 3E 3F 3F 3F 2D 2D 2D 2D 2D 3E 3F 3F 3F 3F 6D 6D 6D F5 FF FF FF 37 00 6D F5 CH: 2981 6220: FF 37 00 DB DB DB 4A 49 49 D1 DB DB 13 6D 09 F5 FF 77 2D 3E BF AD 18 12 49 CH: 4317 49 DB 53 35 37 35 FF 89 DB 49 49 DΔ DB 49 9B 2D 20 20 20 35 3F 3F 3F 3F 49 09 20 20 AD 3F CH- 3225 6260: 3F 3F **BF** 20 2D 20 2D ΔD DF 3B FF 1B 37 09 2D 4D 31 1F 3F 15 3F 37 2D 3F 6D 3F 6D 2D 2D 00 3F 3F CH: 2329 6280: 3F 3F 3F 2F 20 2D 2D 2D 2D 3E 3F 3F 3F 3F 3F 2E 2D 2D 2D 2D 2D 3E 3F 3F 3F 3F 3F 2D 2D 2D 2D CH: 1711 62A0: 2D 3F 3F 3F 3F 2D 3F 49 09 2D AD 3F 3F BF 2D 2D 2D 2D AD DF 3B FF 18 37 6D CH: 2439 3F 37 2D 2D 3E 3F 3F 3F 6D OD 3F 3F 2E 2D 2D 2D 2D 3E 3F 3F 3F 3F 2E 2D 2D 2D CH: 1738 62E0: 2D 2D 3F 3F 3F 3F 3F 2E 2D 3E 3F 2D 2D 2D 2D 3F 3F 3F 3F 49 49 11 3F 3F 3F 2D 17 2D 2D 20 CH: 1743 6300: 15 FF 1B OD 2D OD OD FE 18 3F DF 33 2D 2D 3F 3F 6E 2D 2D 2D 3E 3F 3F 37 2D 2D 2D 2D 2D 3E CH: 2278 6320: 3F 3F 3F 3F 37 2D 6D 09 2D 35 3F 3F 3F 3F 3F 2E 2D 2D 2D 2D 35 3F 3F 3F 3F 3F 2E ND 6D 6D 35 FF CH: 2062 6340: FF 37 00 6D AD FF FF FF 37 00 4D 49 49 D1 DB DB 49 49 D1 DB DB DB 4A 49 49 89 DB DR 53 CH: 4720 DB 6360: 49 DΔ DR 9R 49 49 D1 DB DB DB 49 49 89 DB DB DB 53 49 DB 49 49 DΔ CH: 4461 6380: D1 DB 13 00 05 05 00 00 00 00 05 00 05 05 00 05 00 49 89 49 49 AD 49 6E 49 CH: 4781 63CO: DB 49 49 12 DB 00 DR 9R 00 00 D1 DB DB 13 00 00 00 05 00 05 00 05 CH: 2334 05 9B 63E0: 05 00 89 49 DR DB DΔ DB DB 53 49 49 89 DB DB DB 49 49 D1 DB 09 44 DB 13 CH: 4283 6400: 77 2D RF 6D AD 18 BF 12 00 49 49 89 DB 05 00 05 00 05 00 05 00 05 00 05 00 49 49 49 49 DB 53 49 49 89 DR DB DB 49 49 D1 09 44 DB DB 13 6D F5 FF 77 2D 3E BF 6D AD CH: 4511 18 BF 05 00 05 00 05 00 05 00 05 00 05 00 49 49 89 DR DR 9R 49 49 DR DB 53 DB 19 DΛ 19 19 89 CH: 2803 6460: DB 44 19 D1 DB DB 13 6D 09 F5 FF 77 2D 3E BF 05 00 05 00 00 05 05 6D 05 00 00 05 00 49 49 89 CH: 2562 6480: DB DB DB DB 49 49 DA 53 49 49 89 DB DB DB 49 49 D1 DB DB 13 F5 CH: 4521 DB 49 49 29 DB DB DB 4A 2D 15 DF 18 6E 49 15 FF FF 77 4D 09 FE DB 0E 2D CH: 3943 6D 64CO: 89 DB DB 53 00 OD 0D 4D DB 9B 49 49 49 91 DA DB 49 00 00 52 89 3F 2E F5 9B 49 2D 3E FF DB CH: 3696 64E0: 2A 97 2E 2D 3F 35 11 3F F5 9B 00 00 05 00 49 35 37 2D 35 37 F5 BF F5 DB 92 92 00 00 92 CH: 2840 6500: 00 00 AD 37 35 37 35 37 35 37 F5 05 00 29 15 77 AD 37 35 37 35 37 35 37 F5 BF F5 12 05 00 29 CH: 2471 6520: 15 77 37 35 37 35 37 35 37 F5 BF 05 00 29 15 77 AD 37 35 37 35 37 35 37 F5 BF F5 BF 12 00 00 CH: 2756 6540: 49 53 89 DB 9B 49 49 89 DB DB 13 49 49 49 DA 53 89 DB 9B 49 49 89 DB DB 13 6560: FF F5 2E AD FF 09 3B 00 AD DB 9F 12 18 12 49 49 89 6580: 49 35 37 35 2D 35 3F 3F 3F 35 35 CH: 3243 35 37 35 FF 2D 2D 2D 2D 35 3F 3F 3F 3F 77 49 35 37 35 FF DR DR CH: 3343 65CO: 9B 49 DA DB 53 49 35 37 35 FF 9B 2D 2D 2D 2D 35 3F 3F 3F 3F 77 49 35 37 35 FF 9B CH: 3023 12 65E0: 05 00 49 89 DB DB 9B 49 49 DA DB DB 53 49 D1 8A DB 9B 2D 2D 2D 2D 3E 3F 3F 3F 77 49 CH: 3603 DB 9B 12 00 92 92 92 92 29 3E 97 02 00 49 49 89 DB DB 9B 49 49 49 DA DB DB 53 49 11 37 F5 DB 13 CH: 3694 6620: 2D 2D 2D 2D 35 3F 3F 3F 3F 77 49 11 37 F5 DR 93 02 00 09 2D 2D AD 3F 3F 3F BF 2D 4D 29 2D 3E 3F CH: 2347 6640: DF 18 37 6D 09 6D 35 FF FF 1B 37 6D 29 4D 35 FF 3B DF 37 6D 6D 09 35 FF 1B FF 37 2D 6D 49 35 3F CH: 3264 6660: DF 3B 3F 0E 2D 2D 2D F5 3F 3F FF 92 00 00 49 09 35 3F 37 2D 35 37 35 37 35 37 35 37 35 FF 2A 2D CH: 2391

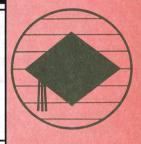
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by Sara Armstrong

## CALENDAR MAKER (accompanies article page 61)

1.

Introduction: Keeping track of time has concerned peoples of the world for eons. A calendar illustrates one time-keeping method. With CALENDAR MAKER you can select a month or year to see on the screen or on paper. FRIDAY'S CHILD gives you the day of the week of any given date.



#### Lesson Objective:

To allow students to explore the calendar in a variety of ways.

#### Prerequisite:

Rudimentary familiarity with the computer.

#### Target age:

Grades 9–12 (See below for other uses)

#### Group size:

4-5

#### Time:

3 class periods (For whole class to finish all projects)

#### **Materials:**

CALENDAR MAKER software APPLEWORKS/ FACTWORKS software (optional) Research materials

Activity I:

- 1. Each student plays FRIDAY'S CHILD to find out what day of the week he or she was born.
- 2. Make several groups. Group I uses the data from FRIDAY'S CHILD to make a bar graph showing how many people in the class were born on each day of the week. (See February/March 1986 of *II Computing* for BASIC GRAPH.)
- 3. Group II uses the same data to construct a graph comparing days of birth of males and females.

- 4. Group III collects data from the FACTWORKS program on day of birth of presidents, or any other group of factual data, and makes a graph.
- 5. Group IV estimates the percentage probability of students in another age class born on each day of the week, then collects and displays data.
- 6. When all data is displayed in graph form, the class, or groups, discuss what, if any, patterns can be seen in the graphs, and what significance they have.

#### Activity II:

- 1. Groups research calendar systems in different cultures, such as Aztec, Mayan or Chinese. They can use printouts from CALENDAR MAKER as points of comparison.
- 2. Groups make their reports to the rest of the class. Information shared should include examples of calendars from the group being discussed.

#### Extensions:

- 1. For elementary-age students: Students discover the day of their birth using FRIDAY'S CHILD. If graphing activities have not been discussed, students write their names on index cards, and build a bar graph on the floor. Then they can create their own with graph paper.
- 2. Students from any grade level can create calendars, decorating them for personal use, or to give as gifts.
- 3. Later elementary and junior high students can replicate suggested activities for the high school students, adapting the task to an appropriate level.
- 4. Record-keeping ideas: Graphs and reports can be displayed, discussed and compiled in class books.

PARENTS: Collect data and build a family tree. Use FRIDAY'S CHILD to discover the day of the week other family members were born. Print out and decorate calendars to record all family events.

## TYPERGHT (accompanies article page 66)



Introduction: With the growth of computer use, we recognize how helpful proper keyboarding/typing is. By teaching children good skills early, we can enhance their computer time. In TYPERIGHT, when students press the computer key that matches each falling letter, a cheerful ghost gobbles up the letter.

Lesson Objective: To encourage students to use correct keyboarding techniques as

they play an educational game.

Prerequisite:

Some familiarity with the

computer.

Target age:

Grades 4-6 (See below for other uses)

Group size: 2

Time: 20-30 minutes

Materials: Keyboard Diagram (See page 66)

> Pencil and paper. Chart with student's name at the top and letters as presented in game alongside.

Activity I:

1. Mount keyboard diagram on monitor screen.

- 2. Students decide who'll be the "working" student and the "helping" student.
- 3. Show students the home row keys and proper placement of fingers on them.
- 4. Have both students say each letter as the working student types it, using the proper finger, moving from right to left. Have students repeat until the sequence is memorized.
- 5. Have helping student say a letter for the working student to type. Helping student first says the letters in order, then at random.
- 6. Repeat above sequence with additional game levels that exercise letters for index and middle fingers and ring and pinky fingers.

#### Activity II:

1. Place the keyboard diagram on the wall above the computer; boot TypeRight.

- 2. First working student plays game at the first level, using home row keys.
- 3. Helping student checks letters missed on the chart.
- 4. Students reverse roles.
- 5. Students go on to higher levels in game as they improve.
- 6. Students discuss letters missed and practice them.

#### Extensions:

- 1. For younger students: Provide each student with a paper keyboard. Introduce "home row" keys and proper placement of fingers. Call out home row letters for the children to press on their keyboard. Repeat this lesson with other letter groups. After some practice, children can play by themselves in pairs or small groups.
- 2. For older students: Introduce the idea of speed related to proper hand and body position, as well as letter placement. Let students

work in pairs. One plays the game for a minute as the other checks hand and body position. Students reverse roles, then discuss how speed and accuracy could be increased. Students record their scores in notebooks each time they play.

- 3. Record-keeping ideas:
  - a. Charts of letters kept by students.
  - b. Records of letters and time kept by students.
  - c. Classroom chart of students and the letters they have mastered.

PARENTS: Your children can practice at home. They can play these games with friends, brothers and sisters, or Mom and Dad! Two or more people at the computer taking turns and offering each other encouragement make learning and practicing a lot more fun.

## FLASH WATH (accompanies article on page 68)



Introduction: Practicing math facts on a brightly-colored computer screen makes memorizing numbers fun. Practice opportunities are unlimited and the computer is always patient. With Math Flash users practice and test themselves on basic math operations in two ways. "Flash Cards" shows a problem, and eventually its answer; "Your Turn" puts a problem on the screen for the user to answer.

Lesson Objective:

To offer students a clear method of math operation practice at a

variety of levels.

Prerequisites: Understanding of numbers, quantities and how to perform

operations.

Target age: Grades 1-3 (See below for other uses)

Group size: 2

Time: 20 minutes per session

Materials: FLASH MATH software. Pencil

and paper. Beads, beans, or other manipulative math materials

#### Activity I:

- 1. Two students come to the computer with paper, pencil and math manipulatives. One student is the "working" student, the other is the "helping" student.
- 2. Students boot program and either students or adult selects operation and range. "Your Turn," and timer off.
- 3. The working student decides on the answer, using manipulatives if necessary, and types it in as the helping student records the problem and answer on the paper.
- 4. After ten problems, students switch roles, taking turns until their computer time is up.
- 5. Students check their work and turn in their papers or add them to their personal math books.

#### Activity II:

1. Teacher sets range of numbers and operation with which youngster is to practice. Teacher also prepares ahead of time a problem sheet with all the math combinations within that range on it.

- 2. Groups of two children come to the computer to practice, equipped with problem sheet. One student boots FLASH MATH, setting it for proper operation and range, slow speed, "Flash Cards." There will be a "working" student and a "helping" student.
- 3. As the problem appears on the screen, the working student calls out the answer, before it appears on the screen. The helping student locates the problem on the problem sheet and records it.
- 4. After ten minutes, the students reverse roles. Since there is a maximum of 15 seconds before the answer appears on the flash card, this option should be used by those who are very near to having the facts memorized.
- 5. Students check their work and turn in their papers, or keep them in personal math books.

#### Extensions:

1. Older students who are nearly finished memorizing math facts can check themselves using the Flash Card

- or Your Turn options, with no manipulative materials, recording their work as above.
- 2. More advanced students can challenge themselves with problems containing up to 7-digit numbers in both positions.
- 3. Record-keeping ideas:
  - a. Student papers show work.
  - b. A classroom chart, which breaks down the memorization tasks, can show who has mastered what. Students who have successfully completed FLASH MATH can check themselves off on the chart.

PARENTS: The computer works very effectively as a practice machine, helping students master math facts. You may want to consult and coordinate with your child's teacher about the range and difficulty of number problems appropriate for your child. Also, having two children working together can turn the program into more of a game and less of a lesson!

OCTOBER / NOVEMBER 1986

## FACTWORKS (accompanies review on page 82)



Introduction: The process of compiling a database extends available information on any topic, and familiarizes students with a powerful use of the computer. FACTWORKS (used with APPLEWORKS) is a commercial database product containing information on many lively topics. In this project, students will be using the "Reptiles" file. You can develop other lessons using other databases in FACTWORKS.

Lesson Objective: To extract information from and

create a database for science

study.

**Prerequisite:** Some familiarity with the

APPLEWORKS system.

Group size: 4

Time: 10-20 minutes

APPLEWORKS and FACTWORKS Materials:

software.

Pencil and paper.

Target age:

Grades 6-9 (See below for other uses)

#### Activity I:

- 1. Each group of students boots FACTWORKS Vol. I and looks at the list of reptiles.
- 2. Students use the FIND and ARRANGE commands to isolate a group of reptiles, based on some characteristic (the five available here are: name, family, distribution, average length, and habitat).
- 3. Students print out records.
- 4. Students research their reptiles further, write and illustrate reports.
- 5. Groups present their reports to other groups, which guess the common characteristic chosen by the group.

#### Activity II:

1. Class prepares a matrix of reptile facts, based on reports; determine new fields for new information.

2. Groups enter their data into a database created with APPLEWORKS; they have the choice of adding to the existing FACTWORKS files or making a new database from the original by using the "Open-Apple-N" function.

#### Extensions:

- 1. For younger students: Discuss "database," "file," "record," and "field." Create a paper database of animal characteristics.
- 2. For older students: Have students add to the reptile file by tracing evolutionary paths. Encourage students to write students in other states and countries in which their reptiles live.
- 3. Record-keeping ideas: The databases themselves are records that can be kept, maintained and supplemented.

PARENTS: Databases are simply organized bodies of information. Create some family databases at homefavorite vacation spots, restaurants or other activities. You can also easily adapt the activities here to things you can do at home. You can make up databases of neighborhood or backyard animals, animals at the zoo or in the park.

Sara Armstrong founded an elementary Montessori school in Hayward, California, where she also teaches. She's an educational consultant for various software companies and developed lesson plans for the State of California's "Technology in the Curriculum" series.

6680: 2D 3F 3F 92 00 00 2D AD 3F 3F 3F BF 2D 4D 09 2D 3E DF DB 3B 2E 4D 49 29 1E BF 2D CH: 2887 3F 2D 4D 09 2D 3E DF DB **3B** 2E 29 F5 4D 49 1E BF BF F5 BF F5 BF 2D 2D 2D 35 20 CH: 3399 3F **B7** 00 09 20 AD 3F 3F 3F BF 2D 09 2D 2D 4D 3E DF DB 3B 4E 49 49 35 3F DF 2D 2A 35 3F CH: 2531 29 35 FF DB DB 49 29 3F FF DB 3F 0E 2D 2D 2D 3F 3F 2A 4D F5 FF 92 00 00 49 49 35 3F 17 6D 29 3E DF 3B 17 49 35 FF DB 37 2D 2D 2D 2D 3F 6D 35 3F 3F 3F 77 49 09 35 2D 2D 35 3F 3F 3F 3F 37 35 37 6D 49 11 3F 3F 37 3F 2D 2D 2D 2D 15 3F DF DB 77 CH: 2138 2E FF DB 3B 0E 2D 2D 2D F5 3F 3F FF 92 00 00 09 2D 2D AD 3F 3F 3F BF 2D 4D 49 F5 CH: 3049 6760: DB 2E 4D 3A 3F FF 37 2D 2D 2D 2D 15 3F DF 18 3F 2E 4D 49 29 3E DF DB 3B 2E 4D 49 29 3E FF CH: 2836 DB 0E 2D 2D 2D F5 3F 3F FF 92 00 00 00 05 00 05 00 05 00 05 00 05 00 05 00 05 00 05 00 00 CH: 1248 05 00 05 00 05 00 05 00 05 00 05 00 05 00 05 00 05 00 05 00 05 00 05 00 05 00 05 00 05 00 CH: 80 2D 20 20 2D 35 3F 3F 3F 3F 77 49 49 2D 3E BF 2D 1E 3F 17 2D 1E 3F 2E 3E 2E 3E 2E 3E DF 92 00 00 CH: 2040 2D 3F 09 2D AD 3F 3F BF 2D 4D 2D 3E DF DB 3B 2E 4D 49 29 1E FF DB 77 2D 2D 3F 3F 6800: 4D 09 2D 3E DF DB 3B 2E 4D 49 29 3E FF DB 3F 0E 2D 2D 2D F5 3F 3F FF 92 00 00 09 2D 2D ΔD 3F 3F CH: 2849 2D 4D 09 2D 3E DF DB 3B 2E 4D 49 29 3E DF DB 3B 2E 6D 49 2D 3E 3F 3F 3F 77 2D 2D 2D 1E 3F CH: 2664 17 1E 3F 2D 00 00 17 1E 3F 97 02 05 92 4A 2D 35 3F 37 2D F5 DB 53 49 11 3F 37 2D 35 77 29 CH: 2037 3E 17 F5 37 00 05 00 05 00 05 00 05 00 05 00 49 29 15 3F BF 6D 29 15 FF DB BF 52 49 3A 37 2D 3E CH: 2010 19 20 3E 37 2D DE 9B 92 02 00 92 4A 2D 35 3F 37 2D F5 DB 53 49 11 3F 37 35 3F 20 77 29 3E CH: 2761 37 00 52 49 DA 9B 2D 2D 2D 3E 3F 3F 17 F5 05 00 DΔ 4A 29 3F 57 49 DA 13 2D 35 2D 2D 3F 05 29 68CO: 92 00 05 00 05 00 49 15 3F BF 6D 29 15 FF DB BF 6D 49 09 35 FF DB 18 37 49 49 15 3F BF 6D 29 15 FF DB BF 6D 49 09 35 FF DB 18 37 6D 49 09 35 FF DB 18 37 CH- 2880 6900: 2D 2D 2D 35 3F 3F 3F 37 6D 49 09 35 FF DB 18 37 6D 49 35 FF 09 DB 18 B7 02 2D 2D 00 2D AD 3F CH: 2596 29 6920: 3F 3F 2E 4D 2D 3E DF DB 3B 2E 4D 49 1E FF DB 3B 2E 2D 49 2D 2D 15 3F 3F 3F 3F 2E 4D 49 2D 6940: 3E DB 3B 2E 4D 49 29 3E FF DB 3B 2E 2D 2D 2D F5 3F 3F 3F 77 49 02 00 DA 2D AD 3F 3F 3F BF 2D CH: 3065 4D 09 2D 3E DF DB 3B 2E 3E 2E 3E 2E 3E 2E 4D 49 29 3E FF DB 3F 0E 2D 2D 2D F5 3F 3F FF 92 00 00 CH: 2775 6980 · 2D 3F 3F 3F 2D 20 AD 3F 2E 4D 49 2D 3E DF DB 3B 2E 4D 49 09 2D 2D 3F 3F AD 3F BF 2D 4D 09 3E CH: 2450 69A0: DF 3B 2E 3E 2E 3E 2E 3E 2E 4D 49 29 3E FF DB 3F 0E 2D 2D 2D F5 3F 3F FF 92 00 00 2D 49 2D 3E DF DB 3B 2E 4D 49 29 3E DF DB 3B 2E 4D 49 29 3E DF DB 3B 2E 29 CH: 2893 49 29 FF DB 69F0-DR 3B 2E 4D 3E 3B 2E 2D 2D 2D F5 3F 3F 3F B7 02 00 2D 2D 2D 2D 35 3F 3F 3F 3F CH: 2680 6A00: 37 37 35 37 2D 2D 2D 3F 3F 37 37 2D 2D 35 3E 35 35 37 2D 2D 35 3F 3F 3F 3F **B7** 02 00 2D 2D 2D 2D CH- 1715 6A20: 35 3F 3F 3F 3F 37 35 37 35 37 2D 2D 2D 3E 3F 3F 37 35 37 35 37 35 **B7** 02 00 35 FF DB 18 37 6D 49 CH: 2199 6A40: 09 3F DF 1B 3F 0E 2D 2D 2D F5 3F 3F FF 92 00 00 6D 49 09 35 FF 18 37 09 DB 6D 19 35 FF DR 1R CH- 2904 6A60: 49 19 35 FF DB 18 37 2D 2D 2D 09 2D 2D AD 3F 3F 3F BF 2D 4D 09 2D 3E DB 3B DF 2E 6A80: 3F FF 37 6D 49 2D 35 FF DB 18 37 6D 49 09 35 3F DF 18 3F 0E 2D 2D 3F F5 18 02 00 05 00 05 00 05 00 05 00 05 00 05 05 00 05 00 00 05 00 05 00 05 05 00 CH: 799 6ACO: 00 05 00 05 00 05 00 05 00 00 05 05 00 05 00 05 00 05 00 05 00 05 00 05 6D 49 09 35 FF CH: 569 6AEO: DB18 37 6D 49 09 35 FF DB 18 37 6D 49 09 35 FF DB 18 37 2D 2D 2D 2D 35 3F 3F 3F 3F 37 6D 49 09 CH: 2632 35 49 09 FF DB 18 37 6D 49 35 DB 18 37 6D 35 09 FF DB 18 B7 02 00 09 2D 2D 35 3F 3F 77 29 3F CH 2839 3E 2E 3E 2E 3E 2E 3E 9F 2D 2D 35 3F 3F FF 92 00 00 49 49 09 35 37 35 37 35 37 35 37 FF CH: 2375 6B40: DB 2A 4D 49 29 3E FF DB 3F 0E 2D 2D 2D F5 3F 3F FF 92 00 00 6D 3E 49 29 FF DB 37 6D 09 2D 3F 2E 2D 3E 3F 2F 2D AD 3F 1F 37 6D 29 3F AD DF 3B 2E 4D 09 2D 15 3F 77 CH- 2707 02 00 37 35 37 35 37 35 37 35 37 2D 2D 2D 2D 35 3F 3F 3F 3F **B7** 02 00 6D 49 49 35 FF DB DB CH: 2451 6BA0: 37 2D 4D 49 3E 3F DF 3B 3F 2E OD 2D 2D OD 35 37 35 37 35 37 2D 35 37 35 37 35 37 2D 2D 2D 35 CH: 1808 6BC0: 3F 3F 3F **B**7 02 00 6D 49 49 35 FF DB DB 37 2D 4D 49 2D 3E 3F DF 3B 3F 2E 2D OD. 2D OD. 35 FF 3B CH: 2732 3R 2F 4D 69 09 35 FF DB DB 37 6D 49 49 35 FF DB DB 37 6D 49 49 35 FF DB DB 37 60 49 49 35 FF CH: 4027 02 49 09 6C00: DR DR R7 00 6D 35 FF DB 18 37 6D 49 09 35 FF DB 3B 37 2D 6D 49 35 FF FF 37 1B 6D 6C20: 18 37 49 2D 35 3F DF DB 37 6D 49 09 35 FF DB 18 37 6D 49 09 35 FF 2D 4D 09 2D 3E DF DB 3B 2E 4D 49 29 3E DF DB 3B 2E 4D 49 29 3E DF DR 3R 2E CH: 3028 49 29 3E 3B 2E 29 6060 DR 4D 49 3E FF DB 3F OE 2D 2D 2D F5 3F 3F FF 92 00 00 2D 2D 2D 3F CH: 2945 AD 3F 6C80: 3F 3F 2E 49 2D 3E DF DB 3B 2E 4D 49 29 3E FF DB 3B 2E 2D 2D 2D F5 3F 3F 3F 37 35 37 35 37 35 CH: 2701 6CA0: 02 00 09 2D 2D AD 3F 3F 3F BF 2D 4D 09 2D 3E DF DB 3B 2E 4D 49 29 3E DF DB 3B 2E 4D 49 29 3E CH: 2675 6CCO: DF DB 3B 2E 4D 49 29 3E 1F FF 18 37 6D 09 2D 2D 1E 3F DF 3B 77 2D 2D 2D 2D 3F 3F 3F 1F 9F 12 NN CH: 2446 2D AD 3F 3F 3F 3F 2E 49 2D DF DB 29 4D 3E 3B 2E 4D 49 3E FF DB 3B 2E 2D 2D 2D F5 3F 3F 6D00: 6D 2D 15 3F 37 6D 09 2D 15 3F DF 18 37 6D 49 29 35 FF DB 18 **B7** 02 00 05 2D 3F 37 3E DF DB 3B 2E 4D 49 29 3E FF DB 3B 2E 2D 2D 2D F5 3F 3F 3F 6D 2D 15 3F CH: 2893 37 09 2D 6D40: 6D 15 3F DF 18 37 6D 49 29 35 FF DB **B7** 02 00 00 00 18 05 05 00 05 00 05 05 00 05 00 05 CH: 1604 00 00 00 6D60: 05 05 00 05 05 00 05 05 00 05 00 05 00 05 00 05 00 05 00 05 00 05 09 2D 2D 3F 3F AD CH: 463 2D 4D 2D 3E DF DB 3B 2E 3F 0E 09 15 2D 2D 2D 15 3F 3F 3F 4E 49 2D 3E DF DB 9B 6D 49 09 35 CH- 2581 3F 2D 20 3F 3F FF 92 00 2D ADAO. 3F DF 18 0F 2D F5 00 2D 2D 2D 35 3F 3F 3F 77 3F 49 35 37 35 37 35 37 CH: 2298 6DCO: 37 35 37 35 FF 9B 12 00 09 FF 6D 49 35 DB 18 37 6D 49 09 35 FF DB 18 37 6D 49 09 49 09 DB 18 37 6D 49 09 35 FF DB 18 37 6D 49 35 3F 3F 09 DF 1B 0E 2D 2D 2D F5 00 09 35 FF DB 1B 37 6D 49 09 35 FF DB 18 37 6D 49 09 35 FF 09 35 CH: 3045 DB 18 37 6D 49 37 49 09 35 FF DB 1B 77 6D 49 F5 FF 3B 0E 2D F5 FF 9B 12 00 6D 6D 49 49 35 FF DB DB 37 CH: 3949 DB DB 37 6D 49 49 35 FF DB DB 37 6D 49 49 35 FF DB DB 37 6D 49 49 35 6E40: 6D 49 49 35 FF FF 1B DF 3B CH: 4040 continued on next page

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```

## **HEX.ENTRY**

HEX.ENTRY is *II Computing*'s program for entering object code and other non-BASIC programs and routines. To use HEX.ENTRY, first type in the program on this page and check it with TYPO.II.

Now run HEX.ENTRY, and turn to the Software Library page containing the object code listing. For each row in the object code listing, first type in the hex address (but don't type the colon that follows it) and press RETURN. Then enter each hex value in the row, following it with a RETURN. After the 32nd hex value, HEX.ENTRY will print a checksum on the screen. The checksum should match the checksum at the end of the line in the object code listing; if it doesn't, type the line again, beginning with the hex address.

When you're finished, be sure to save what you've typed in with a BSAVE command. With HEX.ENTRY, you can be sure that your object code is correctly typed and ready to use!

```
REM
         * HEX CODE LOADER AND C
    HECKSUM PROGRAM
         * BY FRANK HAYES
20
    REM
         * (C) 1986 ANTIC PUBLIS
30
    REM
    HING, INC.
         * II COMPUTING
                          UOL.1 N
    REM
    PRINT "LOADING ADDRESS IN H
100
    EX (OR Ø TO QUIT) ?
     INPUT AS: IF AS - "" THEN 1
    02
110
     GOSUB 1000
112
    IF B = - 1 THEN
                        PRINT : GOTO
    100
     IF B > 65535 THEN
                        PRINT "U
    ALUE TOO LARGE": PRINT : GOTO
    100
    IF B = Ø THEN END
116
120 AD - B
130 CH =
140
     FOR C = 0 TO 31
     PRINT C + 1;"
142
     IF C < 9 THEN
                    PRINT "
144
146
     INPUT AS
150
     GOSUB 1000
     IF B -
             - 1 THEN
                        PRINT : GOTO
    142
154
     IF B > 255 THEN PRINT "UAL
    UE TOO LARGE": PRINT : GOTO
    142
156
     POKE AD + C, B
158 CH = CH + B
160
     NEXT C
170
     PRINT : PRINT "CHECKSUM = "
     PRINT "IF CHECKSUM DOESN'T
```

RETYPE THIS ROW."

```
180
     GOTO 100
999
    END
1000 B = 0
     FOR A = 1 TO LEN (AS)
1010
1012 BS = MIDS (AS,A,1)
      IF B$ < "0" OR B$ >
                          "F" THEN
     GOTO 1018
     IF B$ < ":" OR B$ > "@" THEN
1016
     GOTO 1020
1018
    PRINT "BAD HEX VALUE": B =
     - 1: RETURN
1020 B1 -
          ASC (B$) - 48: IF B1 >
    9 THEN B1 - B1 - 7
1022 B = 16 * B + B1
     NEXT A
1024
1026
     RETURN
```

## TYPO II TABLE

Code	Line#	Code	Line#	Code	Line#
XR	10	LB	142	хн	180
LC	20	WL	144	EY	999
UP	30	OG	146	YC	1000
RB	40	GS	150	IA	1010
PT	100	AJ	152	II	1012
OL	102	AR	154	RY	1014
GS	110	NO	156	LU	1016
XT	112	QF	158	PP	1018
FA	114	KE	160	TE	1020
GJ	116	UF	170	VS	1022
PX	120	PQ	172	KA	1024
NN	130	MG	174	GV	1026
ZP	140	HE	176		

174

MATCH,"
PRINT "

PRINT

## **TYPERIGHT**

Article on page 66

```
10 REM * TYPERIGHT
20 REM * BY BILL MARQUARDT
30 REM * (C) 1986 ANTIC PUBLISH
    ING, INC.
   REM * II COMPUTING VOL.2 NO.
50
   SCALE= 1: ROT= 0
60 LOMEM: 16384: GOSUB 10000
   POKE CLR, 0:X = FRE(0): HGR
    : POKE WO, 0:NL = 0:NE = NL:E
   K = NE
80 A = INT (LC * RND (1) + 1)
90 J = INT (240 * RND (1) + 25
100 NL = NL + 1:EK = 0
    XDRAW L(A) AT J,0
110
    FOR I = 10 TO 170 STEP SP
120
130 XDRAW L(A) AT J, I
140 K = PEEK (KEY): IF K > 127 THEN
     POKE CLR, 0: GOSUB 210
    IF I < 170 THEN XDRAW L(A)
     AT J, I
160
   NEXT I: SCALE= 1: XDRAW L(A
    ) AT J,0
170 IF ERR THEN GOSUB 6000
180 SCALE= 1: ERR = 1: IF NL < M
    AX THEN 80
    GOSUB 3000
190
    RESTORE : FOR I = 1 TO 58: READ
    A: NEXT I: GOSUB 10190: GOTO
    IF (K - 159 = L(A)) OR (K -
    191 = L(A)) THEN GOSUB 5000
    :I = 170:ERR = 0: RETURN
   IF EK = 0 THEN NE = NE + 1:
    EK = 1
230 RETURN
3000 REM BETWEEN ROUNDS
3005 HOME : UTAB 21: HTAB 4: POKE
3010 PRINT "YOU MISSED "; NE; " O
    UT OF "; MAX; " ..."
3020 FOR D = 1 TO 1200: NEXT D
3030 IF NE = 0 THEN POKE WO, 0:
    FOR X = 4 TO 244 STEP 4: XDRAW
    2 AT X,170: XDRAW 2 AT X,170
    : NEXT X
3040
     IF NE = \emptyset THEN FOR X = 1 TO
    13: XDRAW ASC ( MID$ ("PERF
    ECT SCORE", X, 1)) - 31 AT 32 +
    (X * 16),170: NEXT X
3050 FOR D = 1 TO 1200: NEXT D
3060 X = FRE (0)
3900 RETURN
5000 REM *** FEED THE GHOST **
5002 XDRAW 4 AT J - 24 + MU, I
5003 XDRAW 4 AT J - 24 + MU, I
5004 XDRAW 5 AT J - 24 + MU, I
5005
    XDRAW 5 AT J - 24 + MV, I
5010 \text{ FOR JJ} = (J - 24) \text{ TO } (J -
    12) STEP 4
5020 XDRAW 2 AT JJ + MV, I
```

```
5030 XDRAW 2 AT JJ + MU, I
5040
     NEXT JJ
5050
     XDRAW L(A) AT J, I
5060 SCALE= 2
5070 FOR D = 1 TO 2
5080 XDRAW 2 AT JJ, (I - 10)
5085 FOR DD = 1 TO 10: NEXT DD
5086 XDRAW 2 AT JJ, (I - 10)
5090 NEXT D
5100 RETURN
6000 REM * EXPLODE LETTER
6010 IF SP < > 15 THEN XDRAW
   L(A) AT J,170
6020 XDRAW 6 AT J,170
     FOR D = 1 TO 30: NEXT D
6025
     XDRAW 6 AT J,170
6030
      XDRAW 4 AT J,170
6045
      FOR D = 1 TO 30: NEXT D
      XDRAW 4 AT J,170
6050
6060 IF EK = 0 THEN NE = NE + 1
6070 EK = 0: RETURN
10000 FOR L = 770 TO 800: READ
    U: POKE L, U: NEXT L
10010 PRINT CHR$ (4); "BLOAD BL
    OCK, A$6000"
10011 POKE 232,0: POKE 233,96
10015 DIM L(27): FOR I = 1 TO 2
    7: READ L(I): NEXT I
10020 D$ = CHR$ (4):KEY = - 16
    384:CLR = - 16368
10030 WO = 49234:WC = 49235
10040 P1 = 49236:P2 = 49237
10050 LR = 49238: HR = 49239
10060 ERR = 1
10070 HGR : HOME : TITLES = "TYP
    ERIGHT"
10080 FOR I = 1 TO LEN (TITLES
10090 A = ASC (MID$ (TITLE$, I,
    1)) - 31
10100 X = 48 + (I * 16)
10110 FOR Y = 10 TO 80 STEP 10
10120 FOR J = 1 TO 2: XDRAW A AT
    X,Y: NEXT J
10130
      NEXT Y: XDRAW A AT X, Y: NEXT
    T
      VTAB 21: HTAB 13
10140
10150
      PRINT "COPYRIGHT 1986"
      HTAB 9: PRINT "ANTIC FUBL
    ISHING, INC."
10165 C = 1:XX = 64
      FOR X = \emptyset TO 264 STEP 4
10170
       XDRAW 2 AT X,110:
    XX THEN GOSUB 12000
       XDRAW 2 AT X,110: NEXT X
10185
      HOME : TEXT
10190
      UTAB 1: HTAB 2: INVERSE
10200
10210 PRINT " SELECT SPEED "
10220 UTAB 3: HTAB 2: PRINT " 1
10230 NORMAL : PRINT " SLOW "
```

continued on next page

10240 UTAB 5: HTAB 2: INVERSE :
PRINT " 2 "; 10250 NORMAL : PRINT " MEDIUM" 10260 UTAB 7: HTAB 2: INVERSE :
PRINT " 3 "; 10270 NORMAL : PRINT " FAST" 10271 VTAB 9: HTAB 2: INVERSE :
PRINT " 4 "; 10272 NORMAL : PRINT " VERY FAS
T"  10275 ONERR GOTO 20000  10290 VTAB 1: HTAB 18: GET SP: IF  SP < 1 OR SP > 4 THEN 10290  10300 VTAB 1: HTAB 18: PRINT SP
10305 ONERR GOTO 20010 10310 UTAB 13: HTAB 2: INVERSE
10320 PRINT " SELECT LEVEL "
10330 VTAB 15: HTAB 2: PRINT " 1 "; 10340 NORMAL : PRINT " BEGINNER
" 10350 UTAB 17: HTAB 2: INVERSE
: PRINT " 2 "; 10360 NORMAL : PRINT " INTERMED
IATE " 10370 UTAB 19: HTAB 2: INVERSE
: PRINT " 3 "; 10380 NORMAL : PRINT " ADVANCED
10384 UTAB 21: HTAB 2: INVERSE : PRINT " 4 ";
10386 NORMAL : PRINT " EXPERT "
10390 UTAB 13: HTAB 18: GET LV: IF LV < 1 OR LV > 4 THEN 10
390 10395
10398 IF SP = 4 THEN SP = 15 10400 IF SP = 3 THEN SP = 10 10410 IF SP = 2 THEN SP = 5 10420 IF SP = 1 THEN SP = 2
10430 FOR D = 1 TO 100: NEXT D 10440 POKE 216,0 10445 HOME: HGR: FOR I = 1 TO
10445 HOME: HGR: FOR I = 1 TO 8: READ A\$,X 10450 A = ASC (A\$) - 31: XDRAW A AT X,80: NEXT I:LC = 8:MAX
10445 HOME: HGR: FOR I = 1 TO 8: READ A\$,X 10450 A = ASC (A\$) - 31: XDRAW A AT X,80: NEXT I:LC = 8:MAX = 10 10460 IF LV > 1 THEN FOR I = 1
10445 HOME: HGR: FOR I = 1 TO B: READ A\$,X  10450 A = ASC (A\$) - 31: XDRAW A AT X,80: NEXT I:LC = 8:MAX = 10  10460 IF LV > 1 THEN FOR I = 1 TO 7: READ A\$,X,Y:A = ASC (A\$) - 31: XDRAW A AT X,Y: NEXT I:LC = 15:MAX = 15  10470 IF LV > 2 THEN FOR I = 1
10445 HOME: HGR: FOR I = 1 TO B: READ A\$,X  10450 A = A\$C (A\$) - 31: XDRAW A AT X,80: NEXT I:LC = B:MAX = 10  10460 IF LV > 1 THEN FOR I = 1 TO 7: READ A\$,X,Y:A = A\$C (A\$) - 31: XDRAW A AT X,Y: NEXT I:LC = 15:MAX = 15  10470 IF LV > 2 THEN FOR I = 1 TO 5: READ A\$,X,Y:A = A\$C (A\$) - 31: XDRAW A AT X,Y: NEXT I:LC = 20:MAX = 20  10480 IF LV > 3 THEN FOR I = 1 TO 7: READ A\$,X,Y:A = A\$C (A\$) - 31: XDRAW A AT X,Y: NEXT
10445 HOME: HGR: FOR I = 1 TO B: READ A\$,X  10450 A = ASC (A\$) - 31: XDRAW A AT X,80: NEXT I:LC = B:MAX = 10  10460 IF LV > 1 THEN FOR I = 1 TO 7: READ A\$,X,Y:A = ASC (A\$) - 31: XDRAW A AT X,Y: NEXT I:LC = 15:MAX = 15  10470 IF LV > 2 THEN FOR I = 1 TO 5: READ A\$,X,Y:A = ASC (A\$) - 31: XDRAW A AT X,Y: NEXT I:LC = 20:MAX = 20  10480 IF LV > 3 THEN FOR I = 1 TO 7: READ A\$,X,Y:A = ASC

" BAR TO BEGIN..."; 10510 GET AS 10999 RETURN 12000 REM ERASE TITLE 12005 IF C > LEN (TITLES) THEN RETURN 12010 A = ASC (MID\$ (TITLE\$, C,1)) - 31 XDRAW A AT XX,90 12020 12030 XX = XX + 16:C = C + 1: RETURN 20000 CALL 791: GOTO 10290 CALL 791: GOTO 10390 20010 21000 DATA 173,48,192,136,208,5 ,206,1,3,240,9,202,208,245,1 74,0,3,76,2,3,96 21002 DATA 104,168,104,166,223, 154,72,152,72,96 21005 DATA 34,52,37,39,43,44,45 ,28,38,36,54,46,41,47,58,51, 40,53,55,35,42,48,49,56,57,5 0,59 21010 DATA A,68,S,84,D,100,F,11 6, J, 164, K, 180, L, 196, ;, 212 21020 DATA E,92,64,C,108,96,U,1 56,64,M,172,96,H,148,80,N,15 6,96,Y,140,64 21030 DATA R,108,64,6,132,80,T, 124,64,V,124,96,B,140,96 21040 DATA I,172,64,0,188,64,P, 204,64, W, 76,64, X, 92,96, Q, 60, 64, 2, 76, 96

## TYPO II TABLE

Code	Line#	Code	Line#	Code	Line#
TX	10	UZ	5086	EC	10272
KO	20	KG	5090	NX	10275
TH	30	GV	5100	RR	10290
GO	40	LN	6000	MM	10300
WZ	50	LK	6010		10305
KP	60	PJ	6020	ZL	10310
UN	70	KO	6025	DO	10320
ZU	80	PJ	6030	MQ	10330
RQ	90	PF	6040	SL	10340
NO	100	KO	6045	KU	10350
ZQ	110	PF	6050	NN	10360
FF	120	HI	6060	LO	10370
IH	130	NU	6070	AR	10380
KN	140	υW	10000	LF	10384
SZ	150	NR	10010	WI	10386
YR	160	TA	10011	NX	10390
UT	170	KP	10015	TX	10395
ZB	180	AQ	10020	JT	10398
GW	190	НП	10030	HL	10400
DY	200	WP	10040	OM	10410
IU	210	LJ	10050	ND	10420
IL	220	HW	10060	IS	10430
GV	230	PK	10070	SM	10440
QD	3000	RX	10080	NH	10445
KR	3005	CJ	10090	KX	10450
NU	3010	KP	10100	WR	10460
JS	3020	BA	10110	GI	10470
IZ	3030	KK	10120	EM	10480

PZ	3040	SM	10130	AT	10490	MP	5020	YM	10210	GF	20010	
JS		AD	10140	KZ	10500	MP	5030	ED	10220	DO	21000	
QY	3060	RR	10150	QM	10510	TG	5040	IC	10230	AM	21002	
GV	3900	CH	10160	GV	10999	IH	5050	TX	10240	FN	21005	
CE	5000	FA	10165	SG	12000	JT	5060	YW	10250	FB	21010	
VQ	5002	DF	10170	HN	12005	MK	5070	UN	10260	TY	21020	
VQ	5003	XQ	10180	ZD	12010	UZ	5080	OS	10270	LR	21030	
VS	5004	SX	10185	AF	12020	CF	5085	UD	10271	QR	21040	
VS	5005	AC	10190	CD	12030							
KF	5010	BI	10200	FIII	20000	Tota	1 check	SUM =	3823988			

## THINKING ABOUT THINKING

Article on page 76

## **EXPERT**

REM

20 REM

10

\* EXPERT

\* BY DANIEL WOLF AND FR

	ANK HAYES FOR II COMPUTING
30	REM * (C) 1986 ANTIC PUBLIS
	HING, INC.
40	REM * II COMPUTING VOL.2 N
10	0.1
50	REM THIS VERSION CAN USE UP
26	TO 10 RULES AND 10 VARIABLE
Aggs.	S
60	HOME
70	REM FIRST INITIALIZE ARRAYS
	WITH VARIABLES AND RULES
80	DIM AN\$(10), RU(10,7)
90	AN\$(1) = "PRINTER IS TURNED O
	FF"
100	ANS(2) = "NO PRINTER IS CONN
	ECTED"
110	ANS(3) = "PRINTER IS NOT ON
110	LINE"
170	
120	
1200	RMED 'PR#1'"
130	
	D UP BECAUSE OF THE PRINTER"
	ANS(6) = ""
150	AN\$(7) = ""
	ANS(7) = "" ANS(8) = ""
160	
160 170	ANS(8) = ""
160 170 180	ANS(8) = "" ANS(9) = "" ANS(10) = ""
160 170 180 190	ANS(8) = "" ANS(9) = "" ANS(10) = "" REM THERE ARE FIVE RULES
160 170 180 190 200	ANS(8) = "" ANS(9) = "" ANS(10) = "" REM THERE ARE FIVE RULES RULES = 5
160 170 180 190	ANS(8) = "" ANS(9) = "" ANS(10) = "" REM THERE ARE FIVE RULES RULES = 5 REM EACH DATA STATEMENT RE
160 170 180 190 200 210	AN\$(8) = "" AN\$(9) = "" AN\$(10) = "" REM THERE ARE FIVE RULES RULES = 5 REM EACH DATA STATEMENT RE PRESENTS A RULE
160 170 180 190 200 210	AN\$(8) = "" AN\$(9) = "" AN\$(10) = "" REM THERE ARE FIVE RULES RULES = 5 REM EACH DATA STATEMENT RE PRESENTS A RULE DATA 3,4,0,0,0,0,5
160 170 180 190 200 210 220 230	AN\$(8) = "" AN\$(9) = "" AN\$(10) = "" REM THERE ARE FIVE RULES RULES = 5 REM EACH DATA STATEMENT RE PRESENTS A RULE DATA 3,4,0,0,0,0,0,5 DATA 1,0,0,0,0,0,3
160 170 180 190 200 210 220 230 240	AN\$(8) = "" AN\$(9) = "" AN\$(10) = "" REM THERE ARE FIVE RULES RULES = 5 REM EACH DATA STATEMENT RE PRESENTS A RULE DATA 3,4,0,0,0,0,0,5 DATA 1,0,0,0,0,0,0,3 DATA 2,0,0,0,0,0,0,3
160 170 180 190 200 210 220 230 240 250	AN\$(8) = "" AN\$(9) = "" AN\$(10) = "" REM THERE ARE FIVE RULES RULES = 5 REM EACH DATA STATEMENT RE PRESENTS A RULE DATA 3,4,0,0,0,0,0,5 DATA 1,0,0,0,0,0,0,3 DATA 2,0,0,0,0,0,0,3 DATA 0,0,0,0,0,0,0,3 DATA 0,0,0,0,0,0,0,0
160 170 180 190 200 210 220 230 240	AN\$(8) = "" AN\$(9) = "" AN\$(10) = "" REM THERE ARE FIVE RULES RULES = 5 REM EACH DATA STATEMENT RE PRESENTS A RULE DATA 3,4,0,0,0,0,0,5 DATA 1,0,0,0,0,0,0,3 DATA 2,0,0,0,0,0,0,3 DATA 0,0,0,0,0,0,0,3 DATA 0,0,0,0,0,0,0,0
160 170 180 190 200 210 220 230 240 250	AN\$(8) = "" AN\$(9) = "" AN\$(10) = "" REM THERE ARE FIVE RULES RULES = 5 REM EACH DATA STATEMENT RE PRESENTS A RULE DATA 3,4,0,0,0,0,0,5 DATA 1,0,0,0,0,0,0,3 DATA 2,0,0,0,0,0,0,3 DATA 0,0,0,0,0,0,0,1 DATA 0,0,0,0,0,0,0,0,2
160 170 180 190 200 210 230 240 250 260 270	AN\$(8) = "" AN\$(9) = "" AN\$(10) = "" REM THERE ARE FIVE RULES RULES = 5 REM EACH DATA STATEMENT RE PRESENTS A RULE DATA 3,4,0,0,0,0,0,5 DATA 1,0,0,0,0,0,0,3 DATA 2,0,0,0,0,0,0,3 DATA 0,0,0,0,0,0,0,0 DATA 0,0,0,0,0,0,0,0 DATA DATA
160 170 180 190 200 210 230 240 250 260 270	AN\$(8) = "" AN\$(9) = "" AN\$(10) = "" REM THERE ARE FIVE RULES RULES = 5 REM EACH DATA STATEMENT RE PRESENTS A RULE DATA 3,4,0,0,0,0,0,5 DATA 1,0,0,0,0,0,0,3 DATA 2,0,0,0,0,0,0,3 DATA 0,0,0,0,0,0,0,0 DATA 0,0,0,0,0,0,0,0 DATA DATA
160 170 180 190 200 210 230 240 250 260 270 280 290	AN\$(8) = "" AN\$(9) = "" AN\$(10) = "" REM THERE ARE FIVE RULES RULES = 5 REM EACH DATA STATEMENT RE PRESENTS A RULE DATA 3,4,0,0,0,0,0,5 DATA 1,0,0,0,0,0,0,3 DATA 2,0,0,0,0,0,0,3 DATA 0,0,0,0,0,0,0,1 DATA 0,0,0,0,0,0,0,0,0 DATA DATA
160 170 180 190 200 210 220 230 240 250 260 270 280 290 300	AN\$(8) = "" AN\$(9) = "" AN\$(10) = "" REM THERE ARE FIVE RULES RULES = 5 REM EACH DATA STATEMENT RE PRESENTS A RULE DATA 3,4,0,0,0,0,0,5 DATA 1,0,0,0,0,0,0,3 DATA 2,0,0,0,0,0,0,3 DATA 0,0,0,0,0,0,0,1 DATA 0,0,0,0,0,0,0,0,0 DATA DATA DATA DATA
160 170 180 190 200 210 230 240 250 260 270 280 300 310	AN\$(8) = "" AN\$(9) = "" AN\$(10) = "" REM THERE ARE FIVE RULES RULES = 5 REM EACH DATA STATEMENT RE PRESENTS A RULE DATA 3,4,0,0,0,0,0,5 DATA 1,0,0,0,0,0,0,3 DATA 2,0,0,0,0,0,0,3 DATA 0,0,0,0,0,0,0,1 DATA 0,0,0,0,0,0,0,0,0 DATA DATA DATA DATA DATA DATA
160 170 180 190 200 210 220 230 240 250 260 270 280 290 300	AN\$(8) = "" AN\$(9) = "" AN\$(10) = "" REM THERE ARE FIVE RULES RULES = 5 REM EACH DATA STATEMENT RE PRESENTS A RULE DATA 3,4,0,0,0,0,0,5 DATA 1,0,0,0,0,0,0,3 DATA 2,0,0,0,0,0,0,3 DATA 0,0,0,0,0,0,0,4 DATA 0,0,0,0,0,0,0,2 DATA DATA DATA DATA DATA DATA FOR C1 = 1 TO RULES

```
READ RU(C1,C2)
    NEXT C2
360
    NEXT C1
    REM NOW INITIALIZE TRUE/FA
370
    LSE ARRAY
380 DIM TR(10)
390 \text{ TR}(0) = 1
400
     REM INITIALIZE STACK
     DIM ST(255):SP = \emptyset
410
     REM SELECT A VARIABLE TO T
420
    EST
     FOR C1 = 1 TO RULES
430
     PRINT C1; " "; AN$(C1)
     NEXT C1
450
460
     PRINT
470
    INPUT "STATEMENT NUMBER TO
    CHECK? [0 TO QUIT] "; T
   IF T > RULES THEN PRINT "N
    O SUCH STATEMENT": GOTO 460
490
    IF T - Ø THEN END
500
    PRINT
510 REM NOW PERFORM THE CONCLU
    SION CHECK ROUTINE
520 A = T:FC = 0
530 REM BACKWARD CHAIN
540 F2 = 0: GOSUB 630: IF F2 = 1
     THEN 540
    REM FORWARD CHAIN
550
560 F1 = 0: GOSUB 920: IF F1 = 1
     THEN FC = 1: GOTO 560
    IF FC = 1 THEN FC = 0: GOTO
    530
     REM REPORT RESULTS
580
    IF TR(T) = 1 THEN PRINT "I
590
    T'S TRUE THAT "; ANS(T): GOTO
    IF TR(T) = -1 THEN PRINT
    "IT'S NOT TRUE THAT "; ANS(T)
    : GOTO 460
610 PRINT "DON'T KNOW WHETHER "
    ;AN$(T): GOTO 460
     REM THIS SUBROUTINE CHECKS
     A VARIABLE USING BACKWARD C
    HAINING
    IF TR(A) < > Ø THEN R = TR
    (A): RETURN
```

continued on next page

```
640 R = 0
650 C1 = 1
     IF A < > RU(C1,7) THEN 790
660
670 C2 - 0
680 \text{ ST(SP)} = \text{C2:SP} = \text{SP} + 1
690 \text{ ST(SP)} = C1:SP = SP + 1
700 \text{ SI(SP)} = A:SP = SP + 1
710 A - RU(C1,C2)
     GOSUB 630
720
730 \text{ SP} = \text{SP} - 1:A = \text{ST(SP)}
740 \text{ SP} = \text{SP} - 1:C1 = \text{ST(SP)}
750 \text{ SP} = \text{SP} - 1:C2 = \text{ST(SP)}
     IF R < 1 THEN R = 0: GOTO 7
760
    90
770 C2 = C2 + 1: IF C2 < 7 THEN
780 R = 1:TR(A) = R: RETURN
790 C1 = C1 + 1: IF C1 < RULES +
    1 THEN 660
800
     IF A - T THEN 890
     PRINT "IS IT TRUE THAT "; AN
810
    $(A); "?"
    PRINT "Y-YES, N-NO, D-DON'T
820
     KNOW
     GET KS: IF KS = "" THEN 830
830
     IF KS = "N" THEN R =
                             - 1: GOTO
    880
     IF K$ = "Y" THEN R = 1: GOTO
850
    880
     IF KS = "D" THEN R = Ø: GOTO
860
    880
870
     GOTO 830
     PRINT KS: PRINT
880
890 \text{ TR}(A) = R
900
     RETURN
     REM
           THIS ROUTINE CHECKS AL
     L RULES USING FORWARD CHAINI
    NG
920
     FOR C1 = 1 TO RULES
     IF TR(RU(C1,7)) < > 0 THEN
930
     1020
940 RT - 0
950
     FOR C2 = 0 TO 6
960 IT = RU(C1,C2)
     IF TR(IT) = 1 THEN RT = RT +
     1
980
     NEXI CS
990
     IF RT <
               > 7 THEN 1020
```

```
1010 TR(IT) = 1:F1 = 1: GOTO 102
0
1020 NEXT C1
1030 RETURN
```

## TYPO II TABLE

Code	Line#	Code	Line#	Code	Line#
O AND MINIOUGINICAN NEW TOLKER BERLINES OF THE STREET OF T	10 20 30 40 50 70 90 110 120 110 110 110 110 110 110 110 11	O PWGMEVUDGPHSSHHWGWFKWFODPUMKYLKLSR	110 3670 370 3890 410 410 410 410 410 410 410 41	TUY JABIUT HICYKWNGEUUUWY ZAFRTYIILUU TUY JABIUT HICYKWNGEUUU WY ZAFRTYIILUU G	700 710 710 710 710 710 710 710 710 710
1 1					

Total checksum = 1919690

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1000 IT = RU(C1,7)

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## GETTING THE PICTURE

Article on page 80

## **DISPLAY.RLE**

10	REM * RLE TO APPLE II HI-RES CONVERT/DISPLAY PROGRAM
20	REM * BY MICHAEL BIANCALANA
30	
	ING, INC.
40	REM * II COMPUTING VOL.2 NO.
100	DS = CHRS (4)
105	ONERR GOTO 270
110	INPUT "DISPLAY WHAT RLE FIL
	E? ";F\$
120	HGR : POKE - 16302,0
130	PRINT DS; "OPEN "FS
140	PRINT DS; "READ "FS
150	GET AS
152	IF A\$ < > CHR\$ (27) THEN
	150
154	GET AS: IF AS < > "G" THEN
	152
156	GET AS: IF AS < > "H" THEN
	152
160	GET AS: A = ASC (AS) - 32: HCOLOR=
3 *	C
	IF A = 0 THEN 250
	IF A < 0 THEN 270
	X1 = X + A
	IF X1 < = 256 THEN 230
	HPLOT X + 12, Y TO 267, Y
550	Y = Y + 1:X = 0:X1 = X1 - 25
	6
230	HPLOT X + 12.Y TO X1 + 11.Y

232 IF X1 = 250	5 THEN X1 - 0:Y -
Y + 1	
240 X = X1	
250 C = NOT C	
260 Z = FRE (0	): GOTO 160
270 PRINT D\$;"[	CLOSE"
280 TEXT : INP	JT "SAVE TO WHAT
BINARY FILE	? ";G\$
	"" THEN PRINT D
\$; "BSAUE "; I	5\$; ", A\$2000, L\$200
a"	

## TYPO II TABLE

Code	Line#	Code	Line#	Code	Line#
CQ	10	QM	150	FY	220
AY	20	UY	152	MG	230
TH	30	VW	154	VQ	232
GO	40	WH	156	LC	240
RR	100	CM	160	ZT	250
QZ	105	RI	170	NH	260
GF	110	RZ	180	GB	270
LG	120	UE	190	ZU	280
PE	130	EM	200	QR	290
IF	140	MI	210		

Total checksum = 432972

## RLE.MAKER

10	REM * APPLE II HI-RES TO R
	LE CONVERTER
20	REM * BY MICHAEL BIANCALAN
	A
30	REM * (C) 1986 ANTIC PUBLI
	SHING, INC.
40	REM * II COMPUTING VOL.2 N
	0.1
	ONERR GOTO 2000
	GOSUB 1000
	FOR Y = 0 TO 191
	FOR X = 0 TO 255
	XDRAW 1 AT X + 12,Y
135	C = PEEK (COL)
140	IF C = FLAG THEN PRINT CHR\$
	(32 + A);:FLAG = NOT FLAG:A
	- 0

```
145 IF A > 94 THEN PRINT
   (32 + A);: PRINT CHR$ (32);
   :A = 0
150 A = A + 1
160
    NEXT X
165
    NEXT Y
    PRINT CHR$ (32 + A);
170
    IF FLAG = Ø THEN PRINT CHRS
    (32);
180 PRINT CHR$ (27); : PRINT
    (71);: PRINT CHR$ (78)
190 PRINT D$; "CLOSE": TEXT : END
1000 COL = 234:FLAG = 0:SHAPE =
   768:D$ = CHR$ (4)
1010 DATA 1,0,4,0,5,0
1020 FOR I = 0 TO 5
```

continued on next page

```
1030
      READ D
1040
      POKE SHAPE + I,D
1050
      NEXT
1100 INPUT "NAME OF HI-RES PICT
    URE: ";F$: IF F$ = "" THEN 1
1110 INPUT "NAME OF RLE FILE:
        "; G$: IF G$ = "" THEN 11
1200
      HGR : POKE - 16302,0
1210
     SCALE= 1: ROT= 0: POKE 232
    ,0: POKE 233,3
1220 PRINT D$; "BLOAD "F$", A$200
1230 PRINT DS; "OPEN "GS
      PRINT DS; "CLOSE "GS
1240
      PRINT DS; "DELETE "GS
1250
     PRINT DS; "OPEN "GS
1260
1270
      PRINT DS; "WRITE "G$
      PRINT
            CHR$ (27);: PRINT
                                 CHR$
    (71);: PRINT CHR$ (72);
1999
      RETURN
2000
      PRINT D$; "CLOSE"
2010
      TEXT
2020 PRINT "ERROR " PEEK (222)"
     IN LINE " PEEK (218) + 256 *
     PEEK (219)
```

## TYPO II TABLE

Code	Line#	Code	Line#	Code	Line#
Code	LINGH	code	LINET	Code	LILIEN
XR	10	LW	165	LG	1200
RS	20	NS	170	BD	1210
XD	30	YN	175	BM	1220
FS	40	DW	180	PQ	1230
AZ	100	YK	190	XU	1240
GS	110	HU	1000	FZ	1250
SB	120	IT	1010	PQ	1260
SJ	125	NI	1020	CN	1270
XJ	130	KL	1030	ZF	1280
LA	135	YU	1040	GV	1999
WM	140	FA	1050	GB	2000
RC	145	YB	1100	FH	2010
OF	150	NU	1110	NR	2020
LU	160				

Total checksum = 659576

## II ERR IS HUMAN

The Font Editor program in the June/July 1986 issue of *II Computing* has a small bug that makes it impossible to create a completely blank character, such as a space.

To correct the bug, LOAD the BASIC program FONT.EDITOR, then type the following lines:

505 IF K=141 and SH>2 THEN 600 1325 POKE 25036,0 SAVE FONT.EDITOR

If you have a font with a damaged space character, you can correct it with another simple fix. For example, to fix the space character in a font named BROADWAY, type these three lines:

BLOAD BROADWAY POKE 25036,0 BSAVE BROADWAY

For a font with a different name, simply substitute the correct name.//

## TYPO II TIP:

REM and DATA statements will sometimes give you the wrong Typo II code, even if the line is typed correctly. That's because Applesoft BASIC preserves every space you type in a REM or DATA line—and adds a space whenever you edit the line. If your program appears to have an extra space after each REM or DATA keyword, try retyping the line with one space less after the keyword—and it should LIST (and match the Typo II code) correctly.

If you have a word processor such as AppleWorks, you can use it to type in BASIC programs. Just type the program into the word processor, then save it as a text (ASCII) file. When you're back in BASIC, type EXEC and then the text file's name—and Applesoft will read in the text file as a BASIC program.//

# CATENDAR MAKER

by DUDLEY GLASS, III

he shortest year in American history was 1752. In September of that year, eleven days were unceremoniously discarded in order to realign the dates with the seasons.

Why were the days so out of line? For more than 1500 years, most of the Western world had used the Julian calendar, named for Julius Caesar. In that calendar, there were 12 months of varying lengths; February had 28 days, except for every fourth year, when it had 29.

Sound familiar? Yes, it's our calendar. Unfortunately, it doesn't quite work; the Julian calendar is a little longer than the natural year—about 14 minutes longer. As the years—and centuries—went by, the drift got worse. Finally, in 1582, Pope Gregory XIII introduced a solution: dropping ten days and adding a new leap-year rule, in which a century year was never a leap year unless it was divisible by 400.

The Gregorian calendar was adopted throughout most of Europe in the 16th century; by the time England (and the American colonies) adopted it, another non-leap century year had passed, so they had to drop 11 days. (A few countries still hadn't made the change by the start of the 20th century; in fact, because Greece used the Julian calendar and was two weeks ahead of most of the world, the American team almost missed the first modern Olympics!)

Unfortunately, the monks who designed the new calendar didn't change much or create a truly rational

structure for it. They didn't get rid of the Julian calendar's quirks, such as four different lengths of months. There was probably little pressure to do so, since it would be almost 200 years before computer programmers would have to start worrying about such

matters. No change in the calendar has occurred since then, so we remain stuck with the question of handling calendars in our programs. One of the trickiest parts of that process is determining the day of the week for a given date. Fortunately, there is an algorithm that does just that. It is called "Zeller's Congruence," and it forms the core of the program CALEN-DAR.MAKER in this month's Software Library on page 42. Type it in and check it with TYPO.II, or select it from the Action Disk menu. When run, CALENDAR.MAKER will show you the calendar for any year after 1752 on your Apple's 80-column

With appropriate modification, you can use the subroutines in CALEN-DAR.MAKER to create a month's full



continued on next page

calendar anywhere on the computer screen to enhance the visual appeal and usefulness of your programs. The Zeller's Congruence subroutine can be used by itself to solve a variety of day-of-the-week calculation problems.

#### HOW IT WORKS

To build the full-year calendar, the program first asks you to input a year, and checks whether it's

a leap year for the varial printing mont lent to dar.

Applesoft's MID\$ function and a string variable, DAYS\$, which has an entire month's calendar in one line. MID\$ extracts a segment of DAYS\$ equivalent to a single line of a monthly calendar. The months are of different lengths, so the program calculates the correct length of the final

MID\$ extraction.

tine. Next, for each month the program

sets the value of YR to the year, MO

to the month (from 1 to 12), and DY

to 1, and GOSUBs to the Zeller sub-

routine, which calculates SD, a num-

ber from 0 to 6 representing Sunday

dar on either the printer (line 300) or

the screen (line 400). Both routines use

Then the program prints the calen-

through Saturday, respectively.

As you can see, we use Zeller's Congruence to provide a key piece of infor-

mation: the day of the week on which the month starts. The algorithm begins by creating an adjusted year and month (YA and MA, respectively), shifting the calendar so February is at the end of the year; this makes subsequent calculations much simpler. Then the algorithm computes the total number of days in the

year up to the desired date. A normal year is 52 weeks plus one day long, so the program adds in the total number of years; a leap year adds

a day, so it adds the number of leap years. To save time, the number of centuries is multiplied by five, since 100 years plus 24 leap years (one every 4 years, except for the century year) is 124 days, and 124 divided by 7 leaves 5 remainder. Finally the program divides the total by 7; the remainder is the number of days shifted.

You can easily use the Zeller's Congruence subroutine yourself; just make sure the correct values are in DY, MO,

and YR, then GOSUB to the subroutine. You should also be careful to avoid using the subroutine's own variables—MA, YA, CN, and CY.

To use the calendar printing routine, you'll need to create DAYS\$ and the array LD; you'll also have to calculate when February is in a leap year, as in lines 115-130 of CALENDAR. MAKER. Finally, you must specify the top left corner of the calendar by providing values for CV and CH, CV should not exceed 18 or CH exceed 58, or the calendar may run off the screen. While CALENDAR.MAKER requires 80 columns to work, a single month can be displayed on a 40column display; in that case, CH should be 18 or less. And the routine destroys the value of CV, so reestablish it each time your program calls the printing subroutine.

#### FRIDAY'S CHILD

A second program, FRIDAYS. CHILD, shows another way to use the Zeller subroutine. The program asks for your birthdate, then tells you what the day of the week that was. To provide a very simple demonstration, the program accepts any date; if you want to claim you were born on August 31, 2903, you can.

The Applesoft subroutines in CALENDAR.MAKER can help your programs deal with some otherwise vexing problems. As with the computer itself, the idea is to free you to do more creative things than figure out whether February 21, 1987, will be a Monday. (It won't.)//

Dudley Glass III is an attorney who has worked in a variety of high-tech environments for many years. He currently specializes in designing and drafting new contracting approaches for a major computer services company.

With this issue of *II Computing* we're starting a new feature called "Teacher/Parent Tips," with lesson plans to enhance and extend programs offered in the magazine. See this pull-out section in the middle of the magazine for lesson plans for CALENDAR MAKER.

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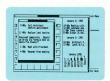
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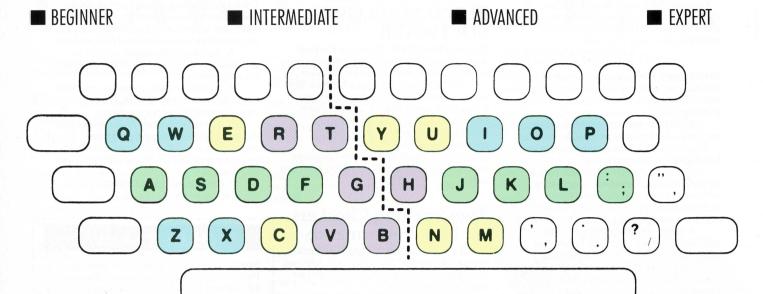
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## **TypeRight**

by BILL MARQUARDT

This month's Game Frame features fast action, suspense and the chance to amaze your typing teacher.

**TypeRight** is a typing practice game with a difference. It works like this: you'll see a series of letters dropping from the top of the screen, one at a time. Your challenge is to type each letter as it falls, before it hits the bottom of the screen

Sound easy? It is—but only at the slowest speed, and at the lowest skill level. When the whole alphabet is thrown in and it's running at top speed, TypeRight is tricky even for a skilled typist.

## A GHOST OF A CHANCE

Type in the program TYPERIGHT from the Software Library on page 55 and check it with TYPO.II, or select it from the Action Disk menu. If you're typing it in, you'll also need the file BLOCK on page 48, which you can type in using HEX.ENTRY.

When you run TYPERIGHT, you'll be able to choose from four speeds and four skill levels. Then letters will begin to drop down the screen. If you type the falling letter before it hits bottom, a ghost will gobble up the letter, giving you a brief breather before the next letter falls. After a round of letters has dropped (the number is different for each skill level), you'll find out how well you've done.

Along with the speed and skill level, you can also customize the character set the game uses. BLOCK.FONT is a standard *II Computing* font; if you want to change the ghost to a bowling ball, or use a different set of letters, just change the font with the Font Editor program from our June/July 1986 issue. (BLOCK.

FONT is also used for this month's Flash Math—see the article on page 68 for more about that program.)

## **TYPING TIPS**

You can play TypeRight as nothing more than a fast-action game, of course, but it's also good practice for typing. At the beginner's level, only the keys on the *home row* are used. The home row is the middle row of letters on your Apple's keyboard—put your index fingers on the F and J keys and let the other fingers of each hand rest on the other keys in the row, and you're ready to type. (Remember, in touch typing you only use your thumb for the space bar.)

Sit with your back upright against the back of your chair, and your feet flat on the floor. Keep your fingers curved and relaxed over the home row, your wrists low and relaxed and your elbows close to your body.

You may want to practice just typing letters on the home row before playing the game, to get the feel of typing with all your fingers. The one non-letter in the game is the semicolon—that's under the little finger of your right hand. Try to keep your fingers over the home row keys as much as possible. If you have an Apple IIe or IIc, you'll notice that there's a small bump on the keys under the middle finger of each hand; that's there to help you stay in position.

Start out at slow speed and beginner's level, until you've got the hang of it. Once you can handle faster speeds, move up to higher levels—they progressively add more letters that are off the home row. As you crank up the speed and the level, and blast away at those letters, you can become not only an expert at TypeRight, but a first-rate typist, too!//

Bill Marquardt is a part-time programmer for Antic Publishing, Inc. He's also the author of "Marble Mania," which appeared in the December/January 1986 issue of II Computing.



top speed, TypeRight is tricky even for a skilled typist.

## FOR KIDS

## Flash Math

Original program by RALPH B. DAVIS SR.



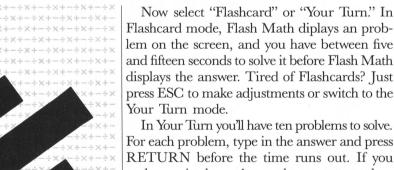
Now, your Apple 7-minus-5 — the world's 1-plus-3-most authority on arithmetic — can help you become a whiz at math, too.

Beat the clock as you brush up on your times tables. Get your kicks by adding 12 and 66. Or give Mom and Dad a short refresher so they can help you with your homework. **Flash**Math can be your personal electronic flashcard system.

Type in FLASH.MATH from the Software Library on page 45 and check it with TYPO.II, or select it from the Action Disk menu. If you're typing it in, you'll also need to use HEX.ENTRY to type in the file BLOCK from page 48.

When you run Flash Math, you'll first select what kind of arithmetic you want to practice: Add, Subtract, Multiply or Divide. Then you need to choose the range for the top and bottom numbers in each problem.

Next set the timer for the length of time to solve each problem. Choose 0 to turn the timer off, or any number between 1 and 9 if you want the timer on — 1 is the slowest and 9 is the fastest. (If you choose Flashcard with the timer off, it will automatically set itself to 1, the slowest speed.)

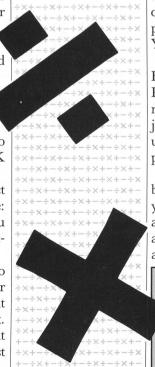


For each problem, type in the answer and press RETURN before the time runs out. If you make a mistake and type the wrong number, just hit the left arrow or DELETE key to back up. When you finish all ten problems the computer will tell you how you scored.

Practicing arithmetic isn't much fun alone—

Practicing arithmetic isn't much fun alone—but with Flash Math you can compete against your family and friends. See just how fast you are— when the numbers get big, even Mom and Dad may find that they need the practice after all.//

With this issue of *II Computing*, we're starting a new feature called "Teacher/Parent Tips," with lesson plans to enhance and extend programs offered in the magazine. See this pull-out section in the middle of the magazine for lesson plans for Flash Math.



## How To Get Hooked On Hacking

by MARGOT COMSTOCK



Margot Comstock, former editor of Softalk, lives on a bluff by the beach, where she spends her days writing, consulting on software, and playing with Apples. Apple II owners share a huge advantage over owners of most micros on the market today we've got a high-level programming language built right into our computer, patiently waiting for the day we get curious enough to fiddle with it.

"But why on earth," say you—teacher, plumber, busy executive, artist, writer—"Why should I care about programming? I just use the computer. Software publishers make all the software I need, and a lot better and more complete than I could make it for years, even if I did learn to program."

## BEATS TWIDDLING YOUR THUMBS

Well, there are lots of answers, but the chief one is, programming is absorbing, relaxing, self-satisfying, exciting and just plain fun. Oh sure, sometimes it can be frustrating too, making you feel fit to be tied—just like trying to get that last square filled in the crossword puzzle or making the tree work just right in your painting. That's part of the deal with any satisfying hobby.

The wonderful thing is that, after a while, what started out as a fun hobby begins looking useful—and can be a means of assuaging frustration. Like that spreadsheet that does everything you want except to print out just the information you need in a format you like: as long as the spreadsheet uses some normal form of files, text or DIF, for instance, you'll just write a little BASIC program to elicit data and print it out your way.

Once you get that far, you're hooked. Pretty soon you'll be writing whole (if simple) programs to do all sorts of peculiar things—peculiar to your unique needs, that is.

## A NATURAL HIGH

Mark Pelczarski, a high school math and science teacher before he turned his programming hobby into Penguin Software, thinks that seeing the computer, this marvelous, power-packed machine, do just what you want it to is the biggest thrill of programming.

"It makes you feel great," Pelczarski says. You've mastered the computer, which feels terrific, but, more than that, you've mastered your own mind. You discover you can discipline your mind to solve a problem in such clear terms that you can tell the solution to this seemingly awesome machine and it will carry it out perfectly. "I think what's exciting is having the computer pay attention—and knowing you did it all by yourself."

## A GOOD EXCUSE

In case pleasure, pride and newfound confidence aren't enough justification for you, here are some things you can do with BASIC programming, determination and a bit of diligence:

Create an index of all your software—one that boots directly, is cinchy to maintain and searches instantly for any word in any entry. Now, it won't be fancy and offer infinite choices of format for records or reports, and it won't print out on any brand of printer but yours, and it won't do a hundred other things that General Manager or dBase II or AppleWorks' data base will do. But it can do precisely what you need for this particular task and it probably will be easier to run and faster, just because it's dedicated. Now create another homemade data base, with a few appropriate alterations, to index your records,

continued on next page

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## SOTTO VOCE

cassettes or videotapes. Now one to replace your little black book. Et cetera, et cetera, et cetera.

Write a program to keep track of deductible expenditures. If you already use a spreadsheet for budgeting, simply include a code for deductibles and write a program that deals with entries with that code in the spreadsheet files. If you're having fun, make the program sort the deductibles according to the IRS's categories. Really ambitious? Teach it to total the expenses in each category, to ask for overall income information from you, and to apply the IRS percentage reductions to medical expenses and contributions. (Look out—at this point you're getting addicted and in danger of becoming an expert.)

If you don't budget on computer—and most of us don't, even though just about everyone buys a fancy home finance program with all sorts of good intentions—you could still write a program to keep track of overall expenses general and deductible expenses in detail. But you probably wouldn't keep it up any more than I would, so, better still, hurry on to the next paragraph and forget this one.

## JUST FOR THE FUN OF IT

It takes a whole lot more than a little BASIC to write a Choplifter. In fact, it takes more than any BASIC to write an arcade game you'd be the least bit satisfied with. But you can write tiny text adventures, design animated on-disk greeting cards and put together light-hearted gift disks.

To write a tiny adventure, you can get along without a real parser. A bunch of IF/THEN statements for the key words and one that admits ignorance for all other words does the trick. (Such a brute-force method would be terribly cumbersome applied to a normal-sized adventure.) Personalizing the events and characters in your adventure, plus letting your own sparkling personality shine through, makes up for full sentence capabilities, hundred-room maps and even total consistency.

On-disk greeting cards are simply program title pages back to back. If you love graphics, it probably won't take you long to learn to animate them a bit.

Making a gift disk really just means personalizing a disk full of public domain or homebrew programs you're giving to a friend. There are a bunch of old freebies that stand the test of time—so long as they're free—like some of the Apple Contributed Programs and old Apple Master programs. Yahtzee, Apple-Trek,

continued on next page

## SOTTO VOCE

can write a tiny text adventure and design animated ondisk greeting cards.

Wozniak's vintage 1977 Mastermind and a few others make a good selection for friends who've never seen them. (Can you solve Nightmare #6?) To make a gift disk of them, gussy up a hello program with bells and whistles and options for choices that run the selected programs automatically.

(What? You don't know about making such a disk, but you'd sure like to receive one? Check with your local Apple user group—you can find many public domain programs that way. Or, if you have a modem, try your local computerized bulletin board.)

## DON'T JUST SIT THERE—GET STARTED!

The Apple's resident language is Applesoft. Applesoft is a version of BASIC [Beginner's All-Purpose Symbolic Instruction Code], a high-level programming language. The term high-level means farther from the binary essence of the machine, higher up the ladder toward our spoken language; in other words, the higher the level of the computer language, the easier it should be for ordinary folks like us to learn to use. And among BASICs (there are many versions) Applesoft is one of the highest and easiest to use. Once you've learned Applesoft, incidentally, you're pretty well able to use any BASIC, with just a review of a few key terms.

Apple's old *Applesoft Tutorial* is a simple, straightforward primer for programming; it's fast and it's fun. New Apples may have updated, newer versions, but chances are they take the same tack. The tutorial's only fault is that it seems to stop abruptly. "Where's volume 2?" you say to yourself. Then, if you are really hooked and have done all the exercises and then some, you'll probably realize that you've actually learned all the facts about Applesoft—now all you have to do is figure out how to put them together in more complex ways.

If you find yourself in this spot, only sans the desire to rediscover the wheel, there are lots of books from which to learn a little more advanced techniques. *Applesoft Isn't Hard*, by Doug Carlston, who started Broderbund Software on the strength of three space adventures he wrote just for the fun of it—in BASIC—is a good one, and there are several others.

### FOR EXTRA CREDIT

While you're working your way through these manuals, try doing more than the exercise at hand. Do it, then add bells and whistles made up of all the other stuff you've learned to that point. Maybe all the exercise does is create a prime number generator or make a sketch-pad—so give it a graphics title page or have it ask for the user's name—whatever fun stuff you can figure out how to do. All of a sudden you'll find you absolutely love seeing the computer doing exactly what you told it, step by step.

Programs like the ones *II Computing* provides on disk and in listings are another source of fodder for your inquiring mind and busy fingers. Once you get them in the computer the way they're written, customize them.

## BEAUTIFUL AND NEW THINGS

Learning to program isn't without its side effects.

"Learning to program helps you organize yourself, think logically," says Pelczarski. You're forced by the computer's binary simplicity "to detail steps in solving a problem and to put those steps into words. You find you have to know your purpose explicitly, learn to identify and describe your goal and then the means to get there."

You don't have relegate your computer to being little more than an interactive television set, a fancy typewriter and calculator, or a document repository. You can open up a whole new world of pleasure, satisfaction and excitement by teaching your Apple to do what you want it to. Because, as they say, "It's a very ancient saying, but a true and honest thought, that if you become a teacher, by your pupil you'll be taught. . . ."

Have fun getting to know your Apple anew.//
In last issue's Sotto Voce, Ultima IV was identified
as a product of Electronic Arts. Ultima IV is produced
by Origin Systems, and distributed by Electronic Arts.

## PRODUCT INFORMATION

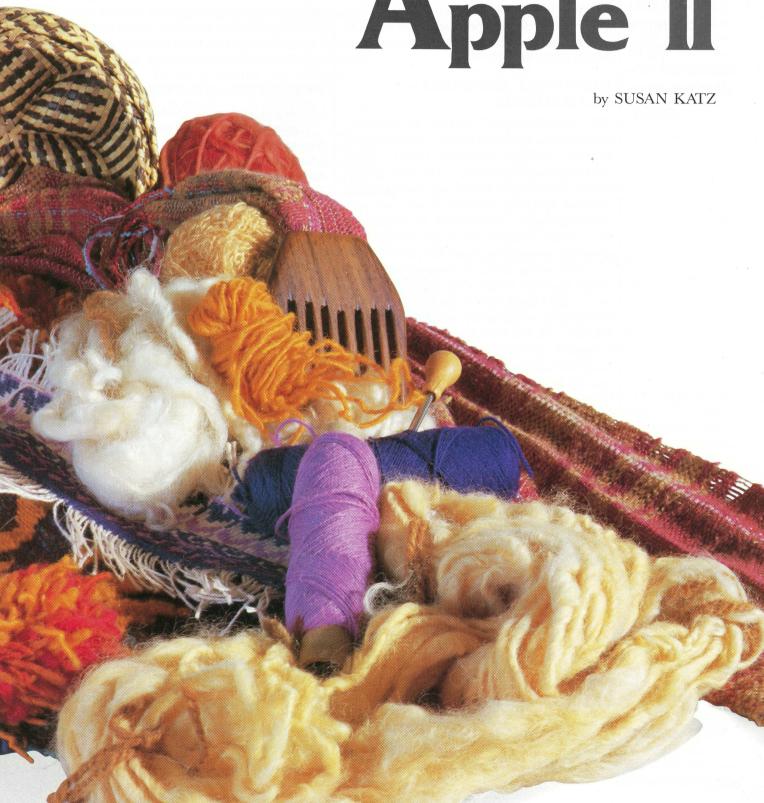
## **Applesoft Isn't Hard**

by Doug Carlston Softalk Books, a division of Penguin Software 830 Fourth Ave., P.O. Box 311 Geneva, IL 60134 (312) 232-1984 CIRCLE 216 ON READER SERVICE CARD

## Needle, Thread

and the





e fiber artists are a funny lot. It's the feel of thread between our hands that draws us in—and the figurative thread of generations before us who've practiced knitting, weaving, cross-stitch and quiltmaking. The same skill hangs as a backdrop to our current craft, no matter how contemporary our designs might be.

So it should be no surprise to find many fiber artists railing at the idea of using computers, at the thought of binary numbers and circuit boards invading our world of textures, colors and fabrics. And the first generation of computer programs for weaving and fiber design didn't help any, either. Only a few years ago, computer-aided fiber design brought to mind endless ugly repetitions of logarithmic kaleidoscopes. The fear of fiber artists that their work would be replaced by such machinations sent many of them scurrying.

Since designers and programmers have begun working together, though, fiber art software has grown out of its infancy. Weavers, cross-stitchers, quilt-makers and others are discovering that, used intelligently, computers can help with the repetitive tasks of drawing and designing. The newer programs can help them visualize what the finished product will look like, analyze fabric and fiber, aid in color exploration, and handle chores like estimating yardage and costs.

To find out more about it, I talked with several fiber artists using Apple IIs today, then tried out some commercially available software on my own.



Linda Tapscott
OCTOBER / NOVEMBER 1986

## COMPUTERS CAN DO IT

For years, Monica Natwig had been designing counted cross-stitch kits of pineapples and hibiscus to sell to tourists in Hawaii. "My software engineer husband had watched me Scotch-tape graphs all over the house," she says. David Natwig figured there had to be a better way, so he created it on their Apple II+: **The Stitch Grapher** 

Stitch Grapher is a tool for designing cross-stitch patterns, eliminating the need for hours with graph paper and pencil. You create the design on the screen in little xs, os, and 28 other symbols. Then with Stitch Grapher's commands you can change its color (by symbol), move or duplicate parts of it, and store your designs on disk to use later. "You might have the right teddy bear but in the wrong corner, or a butterfly you want zapped around a border. It doesn't take the place of a designer," Monica says. "It enhances the designer in you."

Along with Stitch Grapher, the Natwigs also sell **The Weaver**, an Apple II program for 8-harness looms. Their software company, Compucrafts, has taken over much of the time Monica previously spent designing cross-stitch. How much weaving does she do these days? "Lately," she reveals in a voice that has an audible grin, "I've done more weaving on the computer than on the loom."

Free-lance fabric print designer Leslie Nobler-Farber has found that computers enable her to do things with design that would otherwise be tedious and difficult, if not impossible. With the KoalaPad as her electronic easel, she's used MicroIllustrator, Blazing Paddles and Dazzle Draw to create graphics on her Apple II's screen and photograph them, and to generate what she calls "mini-textures" and combine them into large pattern collages. Among the Apple's strengths as a design tool, she finds, is its ability in "the repetitive-iterative thing, where you have a design and you want to repeat it elsewhere." To teach design theory to her computer graphics students at New Jersey's William Patterson College, she has used Scarborough's PatternMaker.

"Tll never go back to the old days," reminisces textile designer Alan Donaldson, "where you spend a whole day with your tongue between your teeth doing the fine paper design and getting one repeat and then maybe saying, 'That doesn't look bad except for the brown, but it'll have to do because I've got a deadline.' What you do today is one repeat in half an hour at the most, then bingo! You press the Return button, and the whole thing spews out continuous repeat all in a stream."

Donaldson is associate professor at North Carolina State University's School of Textiles in Raleigh, and a selfdescribed "ringmaster" of computeraided design in the textile field, coordinating designers of hardware, software and textiles. Each fall he coordinates a major CAD (computer-aided design) conference for the textile industry, and his fervor for intelligently used computers is catching. A primary workstation in his department consists of an Apple II+ and Generation II, by AVL Looms, Inc. There, nestled among the multithousand-dollar looms, students can explore CAD and learn how to create drawdowns-the patterns used in weaving-in a few seconds. The process used to take hours. Donaldson sings the praises of the software: "Generation II is of inestimable value - top drawer. This covers 80 percent of what a designer needs to be able to do."

## TRYING MY HAND

Like Donaldson, I remember the old days. Through the years, I doodled on countless paper napkins, telephone books and graph paper pads en route to quilting. My workroom was filled to overflowing with bags of little construction paper triangles. Could my Apple IIe do for me and my quiltmaking what it had done for the others with their craft? I booted **Patchworks** by Random House to see.

With Patchworks, you can use squares and half-square triangles in three tones (white, black and a medium tone/gray print) to create quilt blocks. The program will randomly generate rows, quarter-blocks or entire blocks,

continued on next page



to my original block, created an interesting symmetry. This is another program that speedily replaces the old cut-and-paste of construction paper shapes, and its use of color (albeit limited) makes it all the more engrossing.

In addition to the "how-to," the manual also presents some elements of design instruction, with demo patterns on disk used to illustrate those principles. The format of the manual is somewhat confusing (instructions that appear to be margin notes often are important prerequisites to information on the body of the page, though that's not clearly stated) and I could not find the initial demo pattern mentioned ("color wheel") on my disk. Overall, though, I found PatternMaker to be an intriguing joy, and I can see how Leslie Nobler-Farber would have it among her teaching tools.

With Broderbund's Dazzle Draw, you have the freeform sketch pad that's missing from the other design programs. Using your own design on screen, you can flip it, move it, reproduce it and fill it with patterns, even creating your own file of color patterns that are remarkably reminiscent of printed fabric. Dazzle Draw comes so close to being a terrific quilting design tool that I'm eager for it to be perfect. It needs a grid overlaid over the entire screen so that designing can be more precise. Design elements should be discrete units so that you can move a triangle and not take the other triangular chunk of background with it. With such changes, I'll be first in line to use a new version.

Instead of making weaving, quiltmaking and cross-stitch more mechanical, the current generation of fiber design software has taken the drudge work out of writing down all the tiny preparatory jottings and combinations, made more room for the twisting, turning and putting together—the fun part of designing-and cut to a fraction the time it takes to actually get our hands on needle and thread.//

Susan Katz is a full-time writer and parttime quiltmaker. Her computer column, 'Home Tech," appears monthly in the Raleigh, NC, Spectator, and she serves on the board of the North Carolina Quilt Symposium, Inc.

OCTOBER / NOVEMBER 1986

## PRODUCT INFORMATION

## Fiber Arts Design Programs: Dazzle Draw (design generation)

Broderbund 17 Paul Drive San Rafael, CA 94903 (415) 479-1700 \$59 95 CIRCLE 201 ON READER SERVICE CARD

## Fairisle Designer (knitting, weaving, needlepoint)

Triple-D Software P.O. Box 642 Layton, UT 84041 (801) 546-2833 \$ 99 CIRCLE 202 ON READER SERVICE CARD

## Generation II and Pattern Master IV (weaving)

**AVL Looms** 601 Orange St. Chico, CA 95926 (916) 893-4915 \$125 each CIRCLE 203 ON READER SERVICE CARD

## The New Yarn Calculator (weaving)

Baker Computer Company 38 Beal St. Winthrop, MA 02152 (617) 846-3395 CIRCLE 204 ON READER SERVICE CARD

## Patchworks (quilting)

Random House, Inc. **Electronic Publishing Division** 201 E. 50th St. New York, NY 10022 (212) 751-2600 \$49.95 CIRCLE 205 ON READER SERVICE CARD

## PatternMaker (design generation)

Scarborough Systems, Inc. 25 N. Broadway Tarrytown, NY 10591 800-221-9884 \$39.95 CIRCLE 206 ON READER SERVICE CARD

## **Blazing Paddles**

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## The Stitch Grapher (counted cross-stitch, needlepoint, design, knitting)

The Weaver (weaving)

Compucrafts RFD 2. Box 216 Lincoln, MA 01773 (617) 259-0409 \$89.95 (Grapher) \$49.95 (Weaver) CIRCLE 207 ON READER SERVICE CARD

## **Publications:** Handwoven

Interweave Press, Inc. 306 N. Washington Ave. Loveland, CO 80537 (303) 669-7672 (Magazine featuring 'Interface,' a column on computers and weaving) \$18 for five issues CIRCLE 209 ON READER SERVICE CARD

## **Quilting and Computers** Newsletter

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## Software for Weavers: A Resource

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## Thinking About Thinking, Part 2

by DANIEL WOLF, Ph.D.



Daniel Wolf is a scientist who likes to use microcomputers to explore mathemetics and scientific concepts. A musician as well, Dr. Wolf has an academic background in biology, physics and math.

The purpose of this short series of articles on "Thinking About Thinking" is to introduce some concepts related to the field of artificial intelligence (AI). Last issue we looked at AI languages, symbol and knowledge processing, and expert systems. Expert systems is one area in which artificial intelligence techniques are achieving wide note and commercial success. In particular, we concluded last time with a BASIC program, BACKCHAIN, showing how an expert system's "inference mechanism" (backward chaining) can trace its way through a set of rules (a knowledge base) that are separate from the inference mechanism.

The backward chaining method is powerful, and it's used in almost all commercial expert systems. It is *recursive*, tracing paths backward through a knowledge "tree." Usually it's possible to get an expert system with a backward chaining mechanism to report an explanation of how conclusions were reached. This information often comes from the stacks used to support the recursion process. If you're curious, you can look at the stacks used in BACKCHAIN (or this month's EXPERT program) after you run it. Just type in this one-line command:

FOR A=0 TO 20:PRINT A,ST(A):NEXT A

This ability to report on their own conclusions is one feature that makes expert systems so appealing.

## FORWARD CHAINING

This time we'll add a forward chaining inferencing mechanism to complement the backward chaining. Forward chaining can be done in several ways, one of which uses recursion like backward chaining. Our forward chaining mechanism will use an *iterative* (that is, repeating) method; it helps provide a different programming example and is in the spirit of my own commercial expert-system program for the Apple II, The Advisor. The forward chaining takes current values of variables and moves "forward" to make additional conclusions.

Backward chaining searches out rules that conclude whatever variable is currently being checked, then takes the antecedents of those rules and evaluates them. That can lead to another round (deeper by one level of recursion) of looking for rules that conclude another rule's antecedent. When no rules can be found that help with the evaluation, a "bottom" node or leaf of the tree has been reached, so a backward chaining system stops and asks the user a question. The backward chainer acts like it's trying to prove something true, and pokes about the knowledge rule tree guided by its goal.

The forward chainer acts differently. It attempts to evaluate all rules, one after another, using only the currently available values for variables. It doesn't stop to ask questions; it just tries to fire each rule and draw a conclusion. If there are any new conclusions after all rules have been tested, the forward chainer may repeat the process from the beginning. When a round of testing fails for all rules, there's no point in repeating, so forward chaining stops.

In The Advisor, forward chaining is used alternately with backward chaining. The Advisor's inference engine waits until the backward chaining process for one variable is complete, then uses forward chaining as far as it will go, and carries on with backward chaining the next

## ADVANCED COMPUTER CONCEPTS

variable selected by the user. The forward chaining can "prune" through large parts of the tree, and make the succeeding rounds of backward chaining quicker because they needn't look as deep into the rule tree. In some cases the forward chaining itself makes a conclusion about one of the variables selected for evaluation and eliminates the need for a later backward evaluation.

Here's a description of this forward chaining algorithm:

- 1. Clear the "found a conclusion" flag.
- 2. Test the first rule.
- 3. If the rule's conclusion variable already has a value, skip the next step.
- 4. If all the antecedents are true, mark the rule's conclusion variable as true and set the "found" flag.
- 5. Repeat steps 3 and 4 for all rules.
- 6. If the "found" flag is set, repeat steps 1-5.

Notice that forward chaining doesn't mark a rule as false just because it's not proven true. There's a very good reason why: forward chaining only looks at one rule at a time, and shouldn't draw any "false" conclusions based on examination of single rules. The backward chainer takes care of the "false" conclusions with its ability to examine a group of rules having a common conclusion.

In order to show how this routine fits into a larger picture, we've integrated a forward chaining mechanism into last issue's BACK-CHAIN program. You'll find EXPERT on page 57 of the Software Library; you can type it in and check it using TYPO.II, or select it from the Action Disk menu. EXPERT is arranged so that the forward chain will occur after each complete round of backward chaining, as in The Advisor.

The program has a sample knowledge base of rules in the form of data statements, just as BACKCHAIN did last month. Each rule has seven antecedents and a conclusion. The five rules are:

IF (printer is not on line) AND (computer has performed 'PR#1') THEN (computer has locked up because of the printer)

IF (printer is turned off) THEN (printer is not on line)

IF (no printer is connected) THEN (printer is not on line)

(computer has performed 'PR#1') (no printer is connected)

The last two rules don't have any IF part; they're just true statements, but they work just like any other rule in this system.

To see the difference forward chaining makes, run the program and ask to check statement 5—whether the computer has locked up because of the printer. The program will first use backward chaining, asking whether the printer is turned off and then concluding that the computer has indeed locked up because of the printer.

Now run the program again. This time, first ask it about statement 2, and wait for the computer's response. Now ask it about statement 5. This time the program will answer without asking any questions. Why? Because after using backward chaining to check statement 2, the program used forward chaining before it responded. As a result, when it checked statement 5, the "clean-up" work done by forward chaining eliminated the need to ask whether the computer was turned off.

As before, you can replace the rules and variables in EXPERT's example with your own, so there's plenty of opportunity to observe the interplay of both inference mechanisms with little systems of your own design. If you design a small knowledge base that's particularly interesting, send it to us at *II Computing*, 524 Second Street, San Francisco CA 94107; we'll publish the best of them in a future issue.

## HARD AND FUZZY

The inference mechanisms presented in these articles deal with only two logical values, true and false. Other inferencing systems may also provide values such as "unknown" or even further, "untested." An expanding area of expert systems uses inference engines that make probabilistic conclusions; that is, their conclusions aren't necessarily a hard true or false. Instead, they conclude with a number—say, between 0 and 1—indicating the strength of the conclusion.

The best way to perform inexact reasoning is a topic of controversy in the AI world, and it's hard to guess just how the controversy will be settled. "Fuzzy" logic is a very powerful technique in which truth is represented as a continuously variable quantity. This is a much more flexible way of using limited knowledge than hard true and false conclusions.

MYCIN, the famous bacterial infection continued on next page

nowledgebased systems is an area of Al undergoing explosive growth today.

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## ADVANCED COMPUTER CONCEPTS

expert system, is a "fuzzy" system that uses a special kind of certainty factor in its rules. The conclusions of MYCIN rules can be given numerical strengths, such as 0.9 (strong) or 0.2 (weak). A doctor using MYCIN to determine what sort of infection a patient has may answer MYCIN's questions with fractional values of certainty. The final result will be one or more probable answers—and MYCIN can tell the doctor just how likely each answer is to be right.

Simply adding a third alternative (like The Advisor's "don't know") goes a long way in softening the inference process. Three-valued logic permits tentative tree searches, which can later be manipulated to force hard conclusions. In the first issue of the new magazine *AI Expert*, Koenraad Lecot and D. Stott Parker described how they use a third logical value (meaning "unknown") to create a basis for flexible implementation of a wide variety of methods. This kind of solution lets expert systems language designers use one programming method while they experiment with different models of reasoning—without knowing what model will work best.

No matter which alternative to simple true/false decision making is taken, there is some

inevitable clash between the ordinary view of what a computer program is and the desire to soften mechanical reasoning to a human form. Reasoning using "chance" seems sort of human, but we may not be completely comfortable with making a computer program do it.

## SEARCHING DEEPER

Knowledge-based systems is the area of AI undergoing the most explosive growth today. That means there are many new books, magazines and journals devoted to this subject. *II Computing* readers with computer science backgrounds may want to explore journals such as *IEEE Expert* and *IEEE Computer. AI Expert* magazine has articles for a wider audience. Peter Jackson's book *Introduction to Expert Systems*, published by Addison-Wesley, is available in paperback and has plenty to offer beginners as well as advanced students of the field.

To wrap up this series in Part 3 of "Thinking About Thinking," we'll explore the relationship between artificial intelligence technology and the brain. I hope it will be an opportunity to let one author's background in physics and brain biology have an impact on how you think about computing and intelligence.//

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logic, truth is
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SHARD OF SPRING", the new multiple-SHARU UP SPHING, THE TOW MUTUPE SSI, character role-playing game from SSI, promises an adventure unbounded by the mundane constraints of reality. It is set in a world where magic overrides the laws of a wond where magic overnues the raws of physics, where monsters, gnomes and elves outnumber mere humans. Your quest is to outnumber mere humans. recover the wondrous Shard, the giver of recover the wondrous share, me giver or elections the wondrous share, me giver or elections crystal the elections correctly the wondrous share or elections correctly the elections of the election of the elections of the electio has been stolen by a demonic sorceress. Assemble five characters and endow them with different combinations of speed, intellect, strength, endurance, and wisely wizardry skills. Then guide them whomas the skills wizardry skills the skills with th through evil dungeons and treacherous lands as they search to regain the Shard. This fantasy game boasts a unique feature: During combat, the tactical screen is

an exact zoom-in shot of where you are on

on disk for 64K Apple® II series and C-64". IBM® version coming soon. the overall map.

In ROADWAR 2000", you get to break a new set of rules, namely the law of safe driving. In the year 2000, bacteriological Wafare has ripped apart the very fabric of American civilization. Cities have turned into gangland prizes, the highways, into battlefields. As the patriotic leader of a road gang. you are asked by what is left of the Federal Government to locate eight scientists and return them to a secret underground lab to develop a cure for the dreaded disease. As you crisscross the nation's highways on your desperate mission, you must constantly battle mutants, cannibals, and rival road gangs for new recruits, vehicles, supplies. gangs on new recruits, removes, supplies (100d, gas, guns, ammunition, and medicine)

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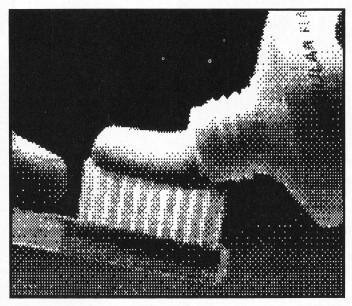
## Getting the Picture

## Downloading Pictures by Modem

by FRANK HAYES and MICHAEL J. BIANCALANA, II Computing staff

Pictures! The Apple II has pictures. So do other computers—IBM, Tandy/Radio Shack, Atari and Commodore. Unfortunately, for the most part there's no easy way to see an Atari picture on your Apple II.

But that's changing, thanks in part to a standard for pictures called RLE (for nun-length encoding). An RLE picture is always a monochrome picture 256 dots wide and 192 dots high. Since most personal computers have graphics with at least 256 by 192 resolution, it's possible to display the same pictures on many different kinds of computer.



t's easy to fill up disks with hi-res pictures once limited to other kinds of computers.

## A STANDARD APPROACH

A regular Apple picture is just a copy of the hi-res graphics memory, copied into a disk file. Other computers use the same technique—they just copy memory into a disk file. Unfortunately, because different computers use different hardware and work in different ways, the files are usually incompatible.

RLE works because, unlike a regular Apple picture, the RLE file is a set of instructions for recreating the picture. If you could listen to an RLE file "talking" to your computer screen, it would sound something like this: "Plot 19 black dots followed by 27 white dots. Now plot 2 black dots followed by 39 white dots. Now plot 57 black dots followed by 1 white dot. . "Each RLE pic-

ture contains exactly 256 times 192, or 49,152 dots, so a program decoding RLE instructions automatically knows when to start each new line. And the instructions are in the form of pairs of printable ASCII characters, so any computer can easily store them in a disk file or send them over a modem to another computer.

In fact, it's CompuServe, the popular on-line service, that has the most RLE pictures available. Compu-Serve uses the format for everything from weather maps to wanted posters. There are special areas on

CompuServe that have large numbers of RLE pictures, many of them contributed by users — including the CB special interest group, the Picture Support Forum, Hollywood Hotline and the FBI 10 Most Wanted List.

## DO IT YOURSELF

You can convert Apple II hi-res pictures to and from RLE format with two programs in this month's Software Library. DISPLAY.RLE shows an RLE picture on your Apple's screen, and saves the picture as an Apple picture file. RLE.MAKER converts an Apple hi-res picture to RLE format, and stores it as a text file. You can type in the programs from the listings beginning on page 39 using TYPO.II, or choose them from the Action Disk menu.

## **GRAPHICS**

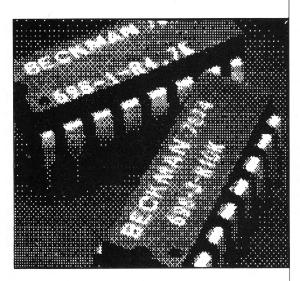
If you have a modem and telecommunications program, you can see RLE pictures from CompuServe and other computerized bulletin boards—even though you can't run these Applesoft BASIC programs at the same time as your communications software. Just capture the ASCII text that's downloaded into a text file, then use DISPLAY.RLE to convert it later into



RENAISSANCE BY GLEN THORSTEINSON

an Apple II picture. In the same way, you can upload an RLE picture you create with RLE.MAKER to a bulletin board or on-line service.

Be careful, though—it's easy to fill up disk after disk with hi-res pictures that once were limited to other kinds of computers. RLE pictures can be addictive!//



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## **REVIEWS**

## **FactWorks**

by ELIZABETH METZGER ARMSTRONG

FACTWORKS Volumes 1, 2 and 3 ImagiMedia Software 16640 Roscoe Place Sepulveda, CA 91343 (818) 891-3707 Apple IIc or 128K Apple IIe (requires one disk drive and AppleWorks software) \$32.95 per volume CIRCLE 217 ON READER SERVICE CARD

What does the word "zoophobia" mean? How many signers of the Declaration of Independence were under 30 years old? Which rivers of the world

are longer than 3,000 miles? What teams have won more than four games in a World Series?

A new software product from ImagiMedia provides answers to these and other questions in a three-volume set called **Fact-Works**, an electronic encyclopedia that includes 88 database, text and spreadsheet files for AppleWorks.

FactWorks sets out to reach as wide an audience as possible by including something for everyone. In this it succeeds. For the variety of areas it covers

(most of them in database files) is impressive: sports, science and technology, animals, history and geography information; home reference files for finding everything from birthstones and area codes to airline toll-free numbers; forms for a rental agreement and a bill of sale; historical documents like the Constitution of the U.S., the Amendments to the Constitution, the Mayflower Compact, and Nixon's Resignation Speech; spreadsheet forms for home and car loans.

Although owning all three volumes lets you give your curiosity free rein, many users may choose to use specific files and not others—each volume costs \$32.95. Sports fans could focus only on sports, for example, by purchasing

only Volume 2. But social studies students and teachers will find history, geography and famous people files in Volumes 1 and 3, and science students and teachers will want the science and animal files in Volumes 1 and 2.

FactWorks' most valuable application is educational; its unique and most comprehensive files, are in the areas of science, animals, history, geography and famous people. It is one answer to the question, "What can I do with my home computer?" For after spending only a few minutes with FactWorks, you will undoubtedly learn something you didn't know before. For example, I learned that the microwave oven was invented in 1945 by an American named Percy L. Spencer and that the giant anteater has an average length



of 45 inches.

Although you can find this information in a library and/or encyclopedia, FactWorks gives you all this data con-

FactWorks is an electronic encyclopedia for use with AppleWorks; though it has a few flaws, the thoroughness and magnitude is amazing.

veniently in three double-sided disks. Most important, using AppleWorks' special features, you can view entire records or zoom in on the details of one item, isolate and reshuffle infor-

mation, make up your own recordselection rules, add categories to and redesign files, insert new data, and print out forms and reports quickly and easily.

In the U.S. Vice Presidents file, for example, I used the OPEN APPLE-Z to zoom in on John Adams, where I learned his birthplace, when he took office, his political party, who he served under, and the main highlights of his life. I used OPEN APPLE-F to find out who served under Ulysses Grant, and OPEN APPLE-R to find out if any vice presidents came from my home state of Pennsylvania. (One did—George Dallas, who served under Polk.) In the Countries file, I used the OPEN APPLE-A to rearrange the display so that it listed countries accord-

ing to population instead of alphabetically.

FactWorks is an excellent introduction to AppleWorks for both new AppleWorks owners and seasoned users who have never used that section of AppleWorks before, for FactWorks provides you with a ready-made body of data for getting your feet wet. The skill level required for using FactWorks matches that needed to use AppleWorks. The FactWorks manual—excellent in its readability and brevity and useful in its inclusion of both an index and a quick reference

card—specifically states "we won't try to teach you how to use AppleWorks here," referring users, instead, to the AppleWorks manual. A summary of AppleWorks' main database features with examples of how to use them with FactWorks files would have been a welcome addition.

The thoroughness and magnitude of FactWorks is amazing, although a few of the files contain some flaws. For example, the Mammals file left out human beings; the Calories file listed plain boiled spaghetti having the same number of calories as spaghetti with tomatoes and cheese; and the Countries file listed Welsh, along with English and Gaelic, as one of the languages spoken in Scotland.

## **REVIEWS**

And though users will probably want to redesign some of the files, that's the real value of FactWorks: its flexibility. It can get you started in setting up your own educational and home reference files, whether your interest is giant anteaters, world populations or Constitutional amendments. My ten-year-old neighbor Jacob wanted to add more information to the Mythology file, while I would expand the Time Zones file to include cities outside the U.S. The beauty of FactWorks is that it lets you change the files or create new ones to fit your own needsan education in itself.//

Elizabeth Metzger Armstrong is a freelance documentation writer and a student in the Secondary Education Credential Program at San Francisco State University.

## The Okimate 20 Printer

by ROBERT GROSSBLATT

Okimate 20
Okidata
532 Fellowship Road
Mount Laurel, NJ 08054
(609) 235-2600; 1-800-OKIDATA
(technical)
\$268 (includes Plug 'N' Print Kit)

Most people have their own idea of what "necessary" means when you start talking about Apple peripherals. Some, for instance, can't imagine life without a modem. Others think of it as the computer equivalent of a CB radio.

Printers, however, are a different story altogether. You need one no matter whether your main interest in computers is programming or Pacman. And since printers are so popular, lots of companies are making lots of printers. Deciding which one is best for you depends on what you want to do with it. Which brings us to the **Okimate 20**.

If you're into color printing, this is one way to do it without having to shell out serious money. The printer carries a suggested list price of \$169 but you need an Okidata Plug 'N' Print kit to connect it to your Apple. The parallel kit lists for \$89 and the serial one goes for \$99. But don't be misled by the low price of the printer. It can do a lot of the same things as the more expensive printers, even though it's not as fast or flexible.

The Okimate 20 has a 24-pin thermal printhead that transfers dots to the paper by melting the waxlike coating on the ribbons. There are two immediate advantages to this kind of printing. The first is that you get deep, rich colors; the second is that the printer is very quiet. The black and color ribbons are packaged in cartridges that are simple to drop into the printer—and thermal ribbons don't get your fingers dirty! Color ribbons cost about \$6 apiece and one ribbon, according to the manual, yields 15 pictures.

Okidata recommends that you use special paper, and if you want to do presentation quality graphics, you should follow their guidelines. For everyday uses, however, you can use just about any kind of paper that doesn't have a high rag content or a coating to make it erasable since the wax has a hard time sticking to these types of paper. Multi-part forms are out of the question as well because the printhead uses heat rather than force of impact to put dots on the paper.

One of the biggest printer headaches is getting it to work with your favorite software. Some wonderful (and expensive) printers have died untimely deaths because popular software couldn't be told how to talk to them. Okidata's solution for the Okimate 20 was to make it compatible with the Apple Scribe. This means, in theory at least, that if your software can talk to a Scribe it can also talk to an Okimate 20. Both Printshop and Printographer worked well with it, but Fontrix didn't work at all. Now, two out of three may be okay for some things, but Fontrix is a popular program and if it found some differences chances are other programs will as well. If you have a favorite graphics program, try it on an Okimate 20 before you buy one. Emulation is an iffy business and you should always remember Murphy's Law.

The text printing capabilities of the Okimate 20 are impressive. It does superscripts, subscripts, italics, underlining, and the near letter quality is fantastic. Characters can be printed in a variety of sizes ranging from 5 to 17 to the inch. As for speed you can get 80 cps in draft, 40 in near letter quality. Telling word processors how to talk to a printer is a much simpler job than configuring graphic software. Every word processor I tried, including AppleWorks, had no difficulty controlling the printer.

The Okimate 20 has a built-in 8K print buffer and various bits of printer esoterica can be set by configuring the dip switches. The well-written manual

Voila! Here's a moderatelypriced color printer that's easy to use and well-documented. Just test software compatibility before you buy.

goes into this but I found the factory settings fine—you probably will also. Okidata also provides some menudriven graphics dump software that's easy to use and makes it simple to take advantage of all the features of the machine.

The Okimate 20 is a neat machine. Thermal printing is a bit more finicky about the kind of paper you use, but it's the only kind of printer that will put images and text on acetate as well as paper. If you're in the market for a printer and have a limited budget, take a good look at the Okimate 20 before you buy. It does many of the things expensive printers do as well as a few they don't.//

Robert Grossblatt contributes to Radio Electronics and other publications. He lives in New York City.

# The Thinking Person's Computer

by NEIL SHAPIRO

When I was a kid, I really had no idea what a computer was and based most of my early preconceptions on low-budget science fiction movies of the fifties. I always pictured computers as huge hunks of metal covered with blinking red lights and massive tape drives, hunkered in a corner somewheres thinking deep, evil thoughts to themselves. I had no doubt that computers *could* think.

Well, later on I found out the truth. Computers like the Apple II are so friendly as to be almost cuddly and they're the next best thing to having a built-in buddy. Unfortunately, computers are also, well, stupid. They just don't think for themselves. At least, that's what I thought until a few of the games mentioned below. . .

## DON'T TREAD ON ME!

Did I say that a smart computer could seem cuddly? Well, the computer opponent in **Ogre** from Origin Systems is anything but that, although it certainly does seem to be as intelligent, canny and inhumanly unforgiving as you should expect a monstrous, futuristic and cybernetic tank to be.

The computer game Ogre is based on the board game of the same name and shares the same futuristic scenario. It is the 21st century and armor is back in style on the world's battlefields, thanks to the invention of "biphase carbide armor" (BPC), which is stronger than steel and light enough to make air-cushioned GEVs (ground-effect vehicles) possible to design and produce. But the cybertank becomes the ultimate expression of tank warfare. It's a huge tank (up to 50 meters) that's fast (45 MPH on atomic-powered treads), armored (two to three meters of BPC), armed (firepower equal to a company

of men) and intelligent. The world's first robot, it is the epitome of machine intelligence and the horror of war.

It's no wonder that some infantryman, probably just before being crushed like an eggshell, named the breed the "Ogre."

Programmer Steve Meuse has turned in a spectacular rendition of the game of Ogre which utilizes the Apple II computer in new and very interesting ways. Indeed, there's no doubt that the game deserves the often too-freely given name of "classic."

The action takes place on a two-screen sized battlefield delineated by hexagonally-gridded areas. But all relation to other "war games" on the Apple ends there, as the programmer has adopted the Macintosh interface to this Apple II game with stunning effect.

Down the side of the screen are pictorial representations of the infantry, tanks, artillery and GEVs that can be utilized by a player designing a battle. Using mouse (or joystick or keyboard) the player moves a cursor atop a playing piece. Then the piece can be picked up and dropped onto the field. Once a field is designed it can be saved to disk. The game comes with some pre-designed fields and scenarios so the game can begin right away.

Game play is extremely simple, although the actual tactics and strategies involved can become quite complex. The screen map may be scrolled by using the mouse to click on arrows to the side of the screen. In that manner the map may be easily scanned. (Joystick commands are as simple to do, but I fell in love with using the mouse so I'll be referring to the mouse for the balance of this review).



Neil Shapiro is editor-at-large of MacUser Magazine and is also chief sysop of the MAUG Apple group on CompuServe.

**OGRE** 



The first time an Ogre comes onto the battlefield a player may feel a twinge of sympathy for the outnumbered machine. The one lone Ogre advances from the bottommost hex row toward a swarming mass of vehicles and infantry bent on its destruction. Sympathy will last about one turn until the Ogre opens devastating fire.

Suddenly it becomes clear: the one Ogre tank not only outnumbers all the player's many pieces in total strength—but the Ogre itself thinks and moves as clearly as if a very intelligent human being were at the controls. Indeed, it fights as if a very intelligent, absolutely perfect and free-from-all-error human being were seated there.

The Ogre tank in the computer game of Ogre is the most awe-inspiring example I have yet seen of artificial intelligence routines. I seldom say that I am truly amazed by a computer program, but Ogre takes me beyond amazement.

Because of its method of player interface, its startling artificial intelligence routines, its pure play value and its overall attention to detail, Ogre gets my personal vote for game of the year.

## TROUBLE IN PARADISE

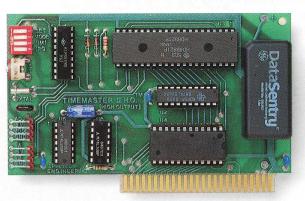
I always thought that I was a pretty friendly guy, easy to get along with and pretty even-tempered overall. That was before I met "Mort," who ostensibly lives inside my computer.

Activision's **The Little Computer People Project** puts a cutaway version of a house on your screen. In that house lives a little person and his doggie. It's up to you to make friends with your own little person, to help him through his day, and to generally get to know him.

When he is happy, he is a smiling, persona-

continued on next page

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ble little chap. For the first couple hours I played with Mort, as he introduced himself to me, I was enchanted. I played some games with him (simple Poker, War and guess-the-word games) and watched as he fed himself. I filled his water cooler (CONTROL-W) and left food for his dog (CONTROL-D) and so on. We wrote letters back and forth. I thought we were developing a true relationship as he moved from room to room of his house doing little people things.

Then, it all went sour. I was really busy one

LITTLE COMPUTER PEOPLE



day and refused to play a game with Mort. First, he shrugged it off and then he started to frown. In fact, he started to frown all the time.

I checked the manual to see how to bring his mood back to sunny. I gave Mort about fifteen records (a few of which he played and most of which he just put into a cabinet), fed him a lot, even patted him on the head (via a droll mechanical hand which appears behind his favorite onscreen armchair). All to no avail.

He began to address his letters "Dear Sir or Madam," he never asked me to play although he would sullenly play a game if I suggested it to him, and he was—let's face it—becoming a real pain.

I don't know where I went wrong, but if all of Activision's 'flittle people' are as ungrateful and downright snippy as Mort, I don't hold out too much hope for their survival. After all, I have already hit Mort's own off switch. . . .

## THINKING ABOUT MURDER

Another try at giving a feel of artificial intelligence to gaming is **Murder on the Mississippi**, also from Activision. It's a murder mystery in which the player takes the part of a "world-renowned sleuth," Sir Charles Foxworth, and tries to solve a murder aboard the Mississippi riverboat the *Delta Princess*.

The game is not a traditional text adventure.

Rather, the player sees an onscreen, graphic representation of the *Delta Princess*'s three decks as well as the interiors of the various cabins and the actual, animated suspects. The onscreen persona of Sir Charles is run by joystick as he moves along the deck, enters rooms and meets suspects.

First the player runs Sir Charles from room to room, looking for a body. Once the body is found, it suddenly becomes easier to get the other people on the boat to answer your questions.

Questioning the suspects (by a multiple-choice routine) is the heart of the game and its most fun feature.

While it is obvious that, from a programming point of view, there are no sophisticated artificial intelligence routines contained in the program itself, the "feel" of talking to the suspects is very real. The conversational prose, the dialogue of the game, is up to many best-selling murder mystery novels and gives you the notion that you are meeting actual personalities.

As you talk to all the suspects, you must take notes, by highlighting (via joystick) key words and phrases from the conversations and transferring them to your notepad. When you do make an accusation, you have to be sure that the facts you have garnered, as supported by



MURDER ON THE MISSISSIPPI

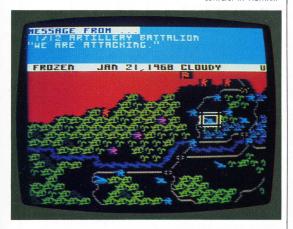
your own notes, back you up.

Don't worry about my giving away the ending. I've played Murder on the Mississippi for many hours already, am looking forward to more, and still haven't solved the crime. But I have met some interesting suspects along the way.

### OF WAR AND STRATEGY

Two new war games from different companies have both advanced the state of that art. **Conflict in Vietnam** from Microprose and **Gettysburg: The Turning Point** from Strategic Simulations,

CONFLICT IN VIETNAM



Inc. (SSI) both add new fillips to each company's existing gaming systems that make such simulations more believable than ever.

Conflict in Vietnam cooly and without any sort of dogma or preconception places scenes from that conflict into an easily playable system. Like the preceding games in Microprose's "Command Series" (Decision in the Desert and Crusade in Europe), the game places a beautiful hi-res map onscreen along with symbols representing both sides. (The double hi-res version is particularly eye-pleasing for those with 128K Apples).

Unlike many other wargames, the "Command Series" games operate in a compressed real-time mode. The player uses the joystick to give each unit an assignment and the unit will go about fulfilling its orders at its own pace. This system has been getting progressively smoother to play and, in this latest game, seems perfected.

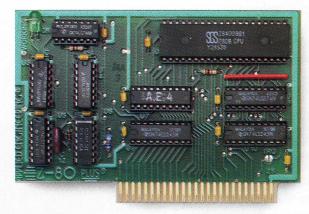
The hidden movement well simulates the Vietnam era of warfare. From the Viet Minh against the French at Dien Bien Phu to 1972's Quang Tri scenario this game well demonstrates the problems faced by both sides in that war.

My only complaint still lies with the fact that Microprose insists on placing "passwords" throughout the manual which must be entered on playing the game. Should you lose the manual and not have copied these passwords, the game is unusable.

SSI's new Gettysburg game builds on the game system introduced in their earlier **Battle** of **Antietam** game. Civil War buffs, rejoice: This is really Gettysburg down to the last tactical detail.

The onscreen map has every hill and valley continued on next page

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The new 5.0 boasts advanced features like built-in disk emulation for popular memory expansion boards, boosting both system speed and storage capacity. And menu-driven utilities that let you get to work faster. The Z-80 Plus also lets you run older CP/M programs—all the way down to Version 1.6 (2.2 is the most popular).

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of that battlefield, every road and terrain is completely and historically represented. The actual units may be shown as silhouette icons or the true wargamer can utilize less artistic but far more exact "symbols." The symbols look very much like the rectangular symbols found on strategic military maps and, when these symbols are used, a unit's tactical facing will contribute toward its achieving (or not) its strategic goals.

Play is very smooth and the computer turns in a very accurate game. Each turn unfolds like a movie with onscreen firing and movement all nicely animated. The game is a must-have for

> GETTYSBURG: THE TURNING POINT



anyone interested in that period of American history.

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The game allows you to first move along a strategic map, carefully husbanding your resources to get to major cities to find more vehicles and more fuel so you can continue your roving. But sooner or later you will have to fight and the action will switch to the tactical screen.

The tactical screen is a delight. You look down on a representation of city streets and of the vehicles involved in the squabble. The player controls each of his vehicles' movements and actions. How many of your road warriors should ride topside on your reconditioned tractor-trailer truck (machine guns blazing) and how many should stay inside? How many Armsmasters should hang out the window of your coupe?

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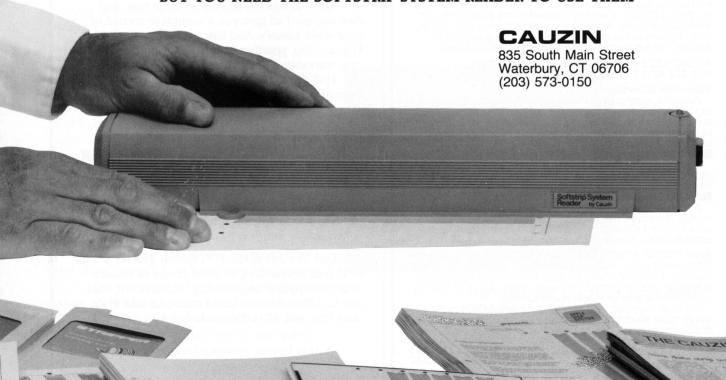
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2

## Meeting the Challenge: Apple Computer Clubs International

by FRANK HAYES, Assistant Editor

At the Apple Computer Clubs International Competition '86 awards weekend, Steve Wozniak was working his way through a maze on the screen of his Apple II. "I like mazes. I used to be pretty good at them. No, that way won't work. There," he said, finishing the last of three mazes in the game. Then he typed RUN and hunched over the keyboard again. "Now this time let's see if I can crash it."

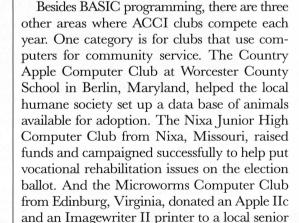
Jennifer Sartory and Elizabeth Dodds didn't write their program, "Mazes for Masterminds," to be tested by the creator of the Apple II. Nor was that why Lans Carstensen and Jeff Forret created their "Presidential Trivia" game, or Jim Martin designed a software speech synthesizer. These five students all belong to computer clubs at their local schools. They entered their Applesoft BASIC programs in the Apple Computer Clubs International (ACCI) annual competition—and won. Meeting Steve Wozniak was an added bonus.

"Apple Computer Clubs International is a program sponsored by Apple to promote the use of personal computers by youth," says ACCI Director John Marvelle. "It's to encourage interaction between teachers and students in the way they work with computers." The program is funded by Apple, but each school chooses how to run its own computer club.

What's so good about a school computer club? "I like the program because it's educationally sound," says Marvelle. "There are a couple things we do that I think are really good. Number one, we recognize excellence. We do this mainly through these competitions. We're getting people to program, but we're also promoting excellence.

"Number two, we're promoting the use of per-

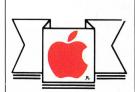
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Computer
Clubs International is a
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Another category is using computers in the school curriculum. For example, Barbara Kuhl and her second-grade class at Fergusen Elemen-

citizen center, then taught the seniors how to

use the computer.



sonal computers through our Challenge program. It's like merit badges for Boy Scouts or Girl Scouts; a young person can earn badges or pins in 11 areas, such as word processing, spreadsheets, programming, and they can learn about these areas by choosing activities that interest them.

"We also hope the Challenge program and the competitions are stretching the way people see how computers can be used. Lots of kids see computers as games. Adults see computers as word processors. Business people see computers as spreadsheets. We want to help people see there are lots of ways of using them. There's even a badge in entertainment—if kids want to use a computer for games, they can do that, but there are 10 other areas they can explore. We're hoping we can get adults as well as kids to stretch the way they see computers."

## **EDUCATION**



Steve Wozniak was an added bonus.

tary School in York, Pennsylvania, used an Apple computer to learn about bears. Fran Fountain's sixth-grade class explored Greek mythology with word processors and data bases. And Jeanne Krapauskas, an art teacher at Victor J. Andrew High School in Tinley Park, Illinois, used a video digitizer and computer graphics to let students create high-tech art—even students who'd never used a computer before!

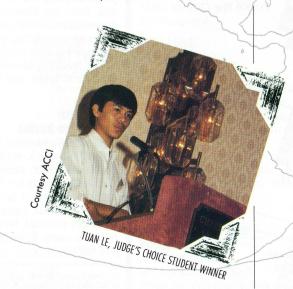
Judge's Choice is a special category. Teacher Mim Bizic of Edgeworth Elementary School in Sewickley, Pennsylvania, has won the ACCI competition before; this time she organized a huge study of ancient Greece and Rome that involved 85 students. Another repeated winner is high school senior Tuan Le, who wrote a Macintosh Pascal program to help other students explore differential calculus. Though he didn't write it for money, there's nothing amateurish about Tuan's program—it's a polished tool for exploring a complex subject.

How do the clubs get started? "The program works through teachers," says John Marvelle. "A lot of teachers would like to do more with computers, but they just don't have time. We try to supply them with the tools to make their job easier. We publish handbooks and a newsletter for teachers that comes out five to seven times a year. This year we're starting something new—a newsletter that's for the students."

And how can you start a computer club at



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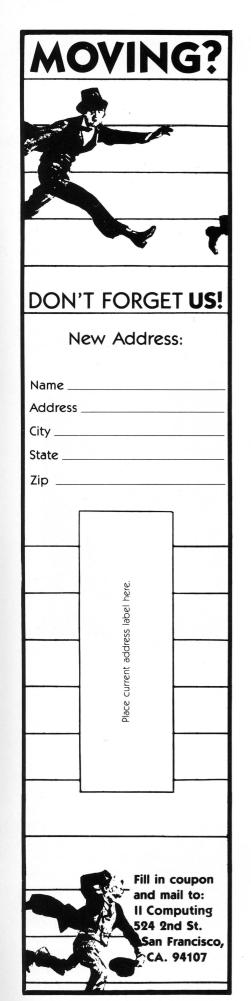
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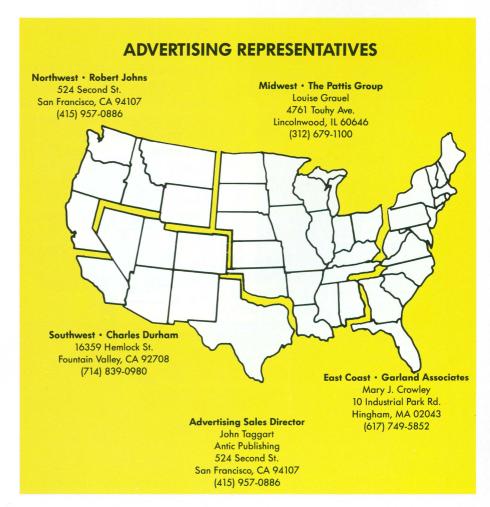
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Foundation Corporation 506 W. Armitage, #1 Chicago, IL 60614 (312) 432-7855 \$250

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Foundation is an integrated wordprocessing, spreadsheet and database system that uses a desktop environment and runs on the Apple IIc or IIe. Additional features include a calendar program for appointmentkeeping and a scientific calculator program. It comes with both a beginner's manual and an advanced use and reference guide.



## **PERSONAL CHOICE**

Personal Choice Software P.O. Box 7287 Mountain View, CA 94039 1-800-227-9759 (415) 960-0410 in California \$49.95 per disk, \$119.95 bundled CIRCLE 257 ON READER SERVICE CARD

The **Personal Choice** collection of personal productivity tools consists of Writer's Choice, a writing, editing and spelling checker program, Filer's Choice, a filing and record-keeping system, and Planner's Choice, a personal planning and spreadsheet system. It runs on the Apple IIc, IIe or II+, and requires 64K of memory for 40-column mode and 128K for 80-column mode.

## **EVERYBODY'S PLANNER**

Abracadata, Inc. P.O. Box 2352 Eugene, OR 97402 (503) 342-3030 \$99.95

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## **POSTURE CHAIR**

Congleton Workplace Systems, Inc. P.O. Box 9440 College Station, TX 77840 (409) 693-9356 \$750

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Designed for people who sit all day, the **Pos-Chair** tries to alleviate back strain in the sitting position. Congleton used research done on posture in weightless conditions to develop this latest entry in the ergo-



### **MOUSEFILER**

Harbor Software, Inc. 403 Great Road, #8 Acton, MA 01720 (617) 263-1870 \$39.95

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A file and directory manager for the Apple IIc or enhanced IIe, **Mouse-Filer** uses a mouse, windows and pull-down menus to let you create and display directories, select programs and text files. The program works with all types of ProDOS disks, including floppy disks, hard disks, RAMdisks and the UniDisk 3.5.



## **SEIKO DATAGRAPH 2001**

Creative Peripherals Unlimited, Inc. 22952 Alcalde Drive, #160 Laguna Hills, 92653 1-800-228-1135 (714) 770-3334 in California \$189.90

CIRCLE 252 ON READER SERVICE CARD

The Seiko Datagraph 2001 is a watch that's also a computer terminal. The timepiece communicates with your 64K Apple II, II+, IIe or IIc through a special wireless interface, and contains its own CPU, 2K of RAM, 2K of ROM and a four-line, 40-character liquid crystal display. With the included Time-Trax software, you can program your watch to remind you of appointments, errands, birthdays, bills to pay; the interface also serves as a clock/calendar for your Apple II.

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4	9	14	19	24	154	159	164	169	174
5	10	15	20	25	155	160	165	170	175
26	31	36	41	46	176	181	186	191	196
27	32	37	42	47	177	182	187	192	197
28	33	38	43	48	178	183	188	193	198
29	34	39	44	49	179	184	189	194	199
30	35	40	45	50	180	185	190	195	200
51	56	61	66	71	201	206	211	216	221
52	57	62	67	72	202	207	212	217	222
53	58	63	68	73	203	208	213	218	223
54	59	64	69	74	204	209	214	219	224
55	60	65	70	75	205	210	215	220	225
76	81	86	91	96	226	231	236	241	246
77	82	87	92	97	227	232	237	242	247
78	83	88	93	98	228	233	238	243	248
79	84	89	94	99	229	234	239	244	249
80	85	90	95	100	230	235	240	245	250
101	106	111	116	121	251	256	261	266	271
102	107	112	117	122	252	257	262	267	272
103	108	113	118	123	253	258	263	268	273
104	109	114	119	124	254	259	264	269	274
105	110	115	120	125	255	260	265	270	275
126	131	136	141	146	276	281	286	291	296
127	132	137	142	147	277	282	287	292	297
128	133	138	143	148	278	283	288	293	298
129	134	139	144	149	279	284	289	294	299
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	. ,	
٩.	What kind of compute	r do you own?
	1. ☐ Apple II 4. ☐	
	2. ☐ Apple II+ 5. ☐	Apple Compatible
	3. $\square$ Apple IIe 6. $\square$	Other
В.	What products do you 6 months?	plan to buy in the next
	1. Printer	6. ☐ Memory
	2. Modem	expansion boards
	3. ☐ Color monitor	7. □ New Apple
	4. ☐ UniDisk 3.5	Computer
	5. Hard disk drive	
7	What are the primary	uses of your computer?
•	1. ☐ Word processing	
	2. D Education	business
	3. ☐ Games and	7. Data bases
	Entertainment	8. ☐ Telecommuni-
	4. ☐ Spreadsheets	cations
	<ol> <li>□ Programming</li> </ol>	9. ☐ Graphics
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5	10	15	20	25	155	160	165	170	175
26	31	36	41	46	176	181	186	191	196
27	32	37	42	47	177	182	187	192	197
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104	109	114	119	124	254	259	264	269	274
105	110	115	120	125	255	260	265	270	275
126	131	136	141	146	276	281	286	291	296
127	132	137	142	147	277	282	287	292	297
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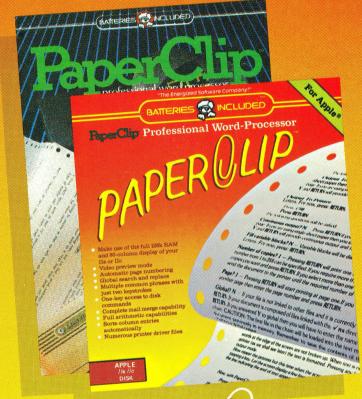
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